Relationships between Binge Drinking and Binge Eating with Facets of Impulsivity, Reinforcement Sensitivity and Attentional Bias

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Abstract

The purpose of the present study was to assess how the specific facets of impulsive personality and behavioral measures of impulsivity are related to binge eating and binge drinking singularly and concurrently. We looked at the three major dimensions of impulsive personality traits: poor Effortful Control (as measured by the UPPS-P), high Reward Sensitivity, and low Punishment Sensitivity (as measured by the Sensitivity to Punishment, Sensitivity to Reward Questionnaire). We obtained data from 75 college students. The data was analyzed using correlation, regression models and mixed models. There was an interference effect for emotion in general in the Stroop task, which demonstrates the effectiveness of the stimuli manipulations as intended for the study. There were no common correlates for the two binge behaviors. Binge eating was associated with Negative Urgency and Lack of Perseverance, while binge drinking was associated with Sensation Seeking, Positive Urgency, Lack of Premeditation, and Punishment and Reward Sensitivity. Eating concerns were associated with Negative Urgency and Punishment Sensitivity, while consequences connected to alcohol use were associated with Positive Urgency and Lack of Premeditation. Higher scores on the Balloon Analogue Risk Task correlated with higher frequencies of binge drinking, providing support for behavioral measures accounting for additional variance in binge behaviors. Interventions and prevention techniques for such risky behaviors should entail distress tolerance training for both positive and negative emotions, and education on how to not lose focus on long-term goals.

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Table 1. Demographic Information and DASS-21 Severity Scores for the Sample

Characteristic	**% (*n*=75)**
Ancestry	
European American	76.2
African American	10.7
East Asian	5.6
Hispanic American	3.6
Asian American	2.1
Middle Eastern	1.2
First Nations	1.2
Indian/South Asian	1.2
Bi-ethnic	2.7
Tri-ethnic	1.3
Multi-ethnic	1.3
Living Situation	
Residence Hall/Dormitory	53.2
University Family Housing	5.2
Off Campus, Parents	2.6
Off Campus, Partner	3.9
Off Campus, Acquaintances	33.8
Off Campus, Alone	1.3
DASS-21 Depression Severity	
Normal	61.6
Mild	12.3
Moderate	12.3
Severe	4.1
Extremely Severe	9.6
DASS-21 Anxiety Severity	
Normal	57.5
Mild	9.6
Moderate	11.0
Severe	11.0
Extremely Severe	11.0
DASS-21 Stress Severity	
Normal	61.1
Mild	12.5
Moderate	15.3
Severe	8.3
Extremely Severe	2.8

Note. Participants were allowed to identify as many ethnic/ancestral backgrounds as they wished, so percents do not add up to 100%. Bi-ethnic means two backgrounds identified, tri-ethnic means three, and multi-ethnic means more than three backgrounds endorsed. DASS-21=Depression Anxiety Stress Scale, 21 Item Version.

Table 2. Demographic, Alcohol Use and Eating Information for the Sample

Characteristic	**M (SD)** **(*n*=75)**
Age	19.53 (1.21)
Year at university	2.35 (1.29)
Alcohol use	
Quant. X freq. past year consumption (drinks)	262.84 (422.66)
Lifetime maximum consumption in 24h (drinks)	9.90 (8.30)
Binge drinking frequency in past 12 mo. (days)	25.14 (42.57)
Binge eating frequency in past 6 mo.	1.00 (1.40)
SMAST total scores	1.47 (1.19)
EDE-Q global scores	1.55 (0.58)
Body mass index	24.84 (4.63)

Note. SMAST=Short Michigan Alcoholism Screening Test, EDE-Q=Eating Disorder Examination Questionnaire.

Table 3. Bivariate Correlations and Partial Correlations Controlling for Sex with Means and Standard Deviations (in parentheses) on the diagonal for Outcome Variables and Impulsivity Traits

Variable	1	2	3	4	5	6	7	8	9	10	11
1. GLS EDE-Q	1.04 (0.29)	**.356****	.224	-.193	.142	**.298***	-.004	**.451*****	.188	.246	-.034
2. EDDS Binge 6 Months	**.353****	0.51 (0.57)	.175	-.101	.138	.076	-.070	**.311****	**.309****	.048	.102
3. SMAST Scores	.221	.175	0.69 (0.58)	.208	.045	.116	.022	**.233***	.196	**.241***	**.359****
4. Binge Drinking	-.211	-.101	.206	2.02 (1.67)	.225	**-.357****	**.448*****	.014	-.044	**.304****	**.352****
5. Reward Sensitivity	.090	.130	.045	**.255***	13.15 (4.25)	.049	**.395****	**.461*****	-.025	**.470*****	.153
6. Punishment Sensitivity	**.260***	.073	.115	**-.321****	.099	12.25 (5.05)	**-.365****	**.253***	**.240***	.031	**-.271***
7. Sensation Seeking	-.020	-.071	.023	**.456*****	**.406*****	**-.337****	2.85 (0.65)	.026	**-.383****	**.391****	.173
8. Negative Urgency	**.396****	**.299***	.228	.047	**.497*****	**.285***	.050	2.23 (0.60)	**.401*****	**.611*****	**.310****
9. Perseverance (Lack of)	.156	**.302****	.194	-.019	.025	**.264***	**-.358****	**.424*****	1.97 (0.55)	.056	**.308****

10. Positive Urgency	.199	.044	**.236***	**.327****	**.505*****	.073	**.403*****	**.633*****	.094	1.85 (0.59)	**.379****
11. Premeditation (Lack of)	-.011	.103	**.354****	**.324****	.104	**-.290***	.156	**.265***	**.276***	**.331****	1.97 (0.51)

Note. GLS = Global Score. EDE-Q = Eating Disorder Examination Questionnaire. EDDS = Eating Disorder Diagnostic Scale. SMAST=Short Michigan Alcoholism Screening Test. N = 63 for GLS-EDE-Q; N = 73 for EDDS Binge 6 Months, Reward Sensitivity, Punishment Sensitivity; N = 74 for UPPS-P scales; and N=75 for SMAST scores and Binge Drinking. Descriptive statistics are for log transformed scores of all measures except UPPS-P and SPSRQ scales. Coefficients in the bottom diagonal are bivariate correlations and above the diagonal are partial correlations accounting for sex, and both were conducted on log transformed data. Correlations were also calculated for binge eating frequency in the past 28 days and past three months. The only difference was that the three month frequency also correlated with SMAST scores, and after controlling for sex, the 28 day frequency also correlated with SMAST scores. Correlations statistically significantly greater than 0 are in bold text.

* $.01 < p \leq .05$; **$.001 < p \leq .01$; *** $p \leq .001$

Table 4. Bivariate Correlations for Outcome Variables, Stroop Interference and Error Scores, and BART Scores

Outcome Variable	Neg-Neu MRT	Pos-Neu MRT	Food-Neu MRT	Alc-Neu MRT	Neg-Neu Err	Pos-Neu Err	Food-Neu Err	Alc-Neu Err	BART AdjAvPump
1. GLS EDE-Q	.013	.003	.087	.121	-.083	-.130	.139	-.024	.007
2. EDDS Binge 6 Months	.002	.100	.014	.105	-.017	-.187	-.016	.024	-.097
3. SMAST Scores	-.038	-.072	-.080	-.024	.027	-.203	.084	.064	.195
4. Binge Drinking	.020	.060	-.027	-.195	-.147	-.200	.001	-.050	**.334****

Note. GLS = Global Score. EDE-Q = Eating Disorder Examination Questionnaire. EDDS = Eating Disorder Diagnostic Scale. SMAST=Short Michigan Alcoholism Screening Test. Neg=Negative, Neu=Neutral, Pos=Positive, Alc=Alcohol, MRT=Mean Reaction Time, Err=Error, BART=Balloon Analogue Risk Task, AdjAvPump=Adjusted Average Pumps. N=75 for SMAST scores and EDDS Binge 6 Months, N = 73 for BART scores and Stroop scores; and N = 63 for GLS-EDE-Q. Correlations statistically significantly greater than 0 are in bold text. Correlations statistically significantly greater than 0 are in bold text.
* $.01 < p \leq .05$; **$.001 < p \leq .01$; *** $p \leq .001$

Table 5. Bivariate Correlations for Impulsivity Traits, Stroop Interference and Error Scores, and BART Scores

Variable	8	9	10	11	12	13	14	15	16
1. SS	.123	.224	.086	.017	-.165	-.120	.147	.035	**.235***
2. NU	-.039	-.010	-.064	.104	.040	**-.259***	-.109	-.117	.091
3. Per	.013	-.007	.041	.041	-.013	**-.331****	-.191	-.112	-.003
4. PU	.058	.037	.033	.025	-.023	-.146	.047	.027	**.294***
5. Pre	.140	.068	.017	.182	.112	-.010	.120	.154	**.264***
6. PunSen	.068	-.066	.024	-.034	.051	.034	-.018	.022	-.055
7. RewSen	-.027	-.069	-.073	-.005	-.125	**-.239***	-.160	-.143	.149
8. Neg-Neu MRT	20.53 (49.27)	**.511*****	**.636*****	**.454*****	**-.252***	-.070	-.149	-.103	.053
9. Pos-Neu MRT		32.95 (60.49)	**.497*****	**.413*****	-.164	-.170	-.093	-.157	.007
10. Food-Neu MRT			7.30 (53.97)	**.654*****	-.113	-.082	-.078	-.149	.034
11. Alc-Neu MRT				-7.36 (48.57)	-.113	-.167	-.120	-.215	.108
12. Neg-Neu Err					0.06 (4.05)	**.518*****	**.473*****	**.536*****	.107

13.Pos-Neu Err						0.93 (5.00)	**.531*** **	**.677*** **	-.135
14.Food-Neu Err							-0.17 (4.49)	**.553*** **	.047
15.Alc-Neu Err								-0.17 (4.38)	-.045
16.BART AdjAvPump									26.63 (13.73)

Note. SS=Sensation Seeking, NU=Negative Urgency, Per=Lack of Perseverance, PU=Positive Urgency, Pre=Lack of Premeditation, PunSen=Punishment Sensitivity, RewSen=Reward Sensitivity, Neg=Negative, Neu=Neutral, Pos=Positive, Alc=Alcohol, MRT=Mean Reaction Time, Err=Error, BART=Balloon Analogue Risk Task, AdjAvPump=Adjusted Average Pumps. N=74 for UPPS-P scales and N = 73 for Reward Sensitivity, Punishment Sensitivity, Stroop scores and BART scores. Correlations statistically significantly greater than 0 are in bold text.

* $.01 < p \leq .05$; ** $.001 < p \leq .01$; *** $p \leq .001$

Table 6. Bivariate Correlations for Outcome Variables, Impulsivity Traits and Valence Slide Ratings with Means and Standard Deviations for the Valence Slide Ratings

Condition	GLS EDE-Q	EDDS 6 Month Binge	SMAST Scores	Binge Drinking	SS	NU	Per	PU	Pre	PunSen	RewSen	M (SD)
1. Neutral Val	**.288***	.041	.032	-.176	.016	-.063	-.099	-.005	-.199	.154	-.070	5.15 (0.57)
2. Positive Val	-.011	-.010	.034	**.254***	**.407*****	**.275***	.043	**.377****	.032	.179	**.332****	3.13 (0.96)
3. Negative Val	.021	.170	-.043	.020	.100	.168	.166	**.237***	-.014	-.059	.048	7.01 (1.16)
4. Food Val	-.072	.049	-.003	-.036	-.120	.004	-.055	.051	.124	.045	.014	3.49 (1.16)
5. Alcohol Val	.095	.011	.193	**.467*****	**.322****	**.311****	.122	**.427*****	.221	-.126	**.394****	4.67 (1.17)

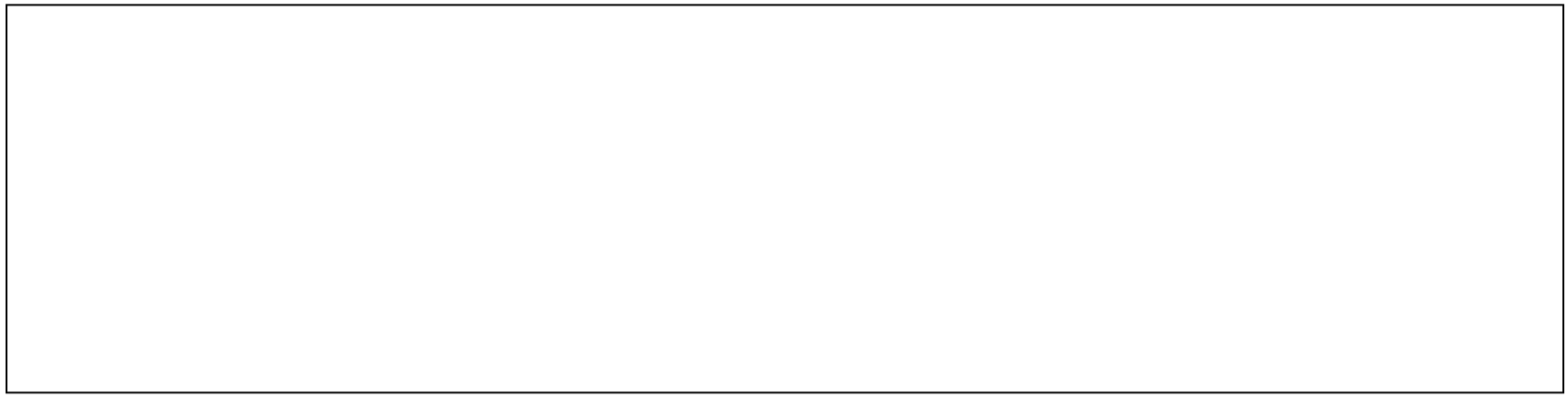

Table 7. Bivariate Correlations for Outcome Variables, Impulsivity Traits and Arousal Slide Ratings with Means and Standard Deviations for the Arousal Slide Ratings

Condition	GLS EDE-Q	EDDS 6 Month Binge	SMAST Scores	Binge Drinking	SS	NU	Per	PU	Pre	PunSen	RewSen	M (SD)
						Step 1	Step 2		Step 3			
1. Neutral Arousal	-.149	.118	.083	.059	.070	.162	-.016	.209	.016	**-.231***	**.269***	6.92 (1.42)
2. Positive Arousal	-.175	.045	.110	**.325****	**.331****	**.306****	.037	**.394****	.070	.046	**.396****	4.09 (1.40)
3. Negative Arousal	.127	.061	.126	.160	-.022	.010	-.037	-.091	.061	-.108	.023	4.79 (1.62)
4. Food Arousal	-.122	.165	.012	.161	.180	.218	-.085	**.262***	.050	-.137	.191	5.09 (1.59)
5. Alcohol Arousal	-.136	.035	.193	**.531*****	**.350****	**.270***	.057	**.398*****	.176	**-.240***	**.382****	5.95 (1.61)

Note. GLS = Global Score. EDE-Q = Eating Disorder Examination Questionnaire. EDDS = Eating Disorder Diagnostic Scale. SMAST=Short Michigan Alcoholism Screening Test. SS=Sensation Seeking, NU=Negative Urgency, Per=Lack of Perseverance, PU=Positive Urgency, Pre=Lack of Premeditation, PunSen=Punishment Sensitivity, RewSen=Reward Sensitivity. N = 63 for GLS EDE-Q; N = 73 for EDDS Binge 6 months, Reward Sensitivity, Punishment Sensitivity, and the Stroop scores; N = 74 for UPPS-P scales; and N=75 for SMAST scores and Binge Drinking. The dependent variables are for log transformed. *R*'s are inverted from the original data due to the slide ratings scale being opposite that of the scale used for slide selection. Higher means are associated with less arousal ratings. Correlations statistically significantly greater than 0 are in bold text.

* $.01 < p \leq .05$; **$.001 < p \leq .01$; *** $p \leq .001$

Table 8. Hierarchical Regression Models with Impulsivity Traits as Predictors of Binge Drinking Frequency

Step in regression model	ΔR^2	$F\Delta R^2$	*df*	β	*p* value for β	β	*p* value for β	β	*p* value for β
Step 1: Sex	.015	1.009	**71**	-.123	.298	-.118	.305	-.096	.397
Step 2: Pun Sensitivity	**.183****	**7.869****	**69**			**-.368**	**.001**	-.186	.138
Rew Sensitivity						**.258**	**.025**	.112	.401
Step 3: UPPS-P SS	**.153***	**3.015***	**64**					**.317**	**.028**
UPPS-P NU								-.238	.145
UPPS-P Per								.153	.253
UPPS-P PU								.205	.191
UPPS-P Pre								.154	.231

Note. Pun = Punishment, Rew = Reward, SS = Sensation Seeking, NU = Negative Urgency, Per = Perseverance, PU = Positive Urgency, Pre = Premeditation. Sex was dummy coded with 0 = male, 1 = female. ΔR^2 is the change in variance accounted relative to the previous step in the regression. By definition ΔR^2 for Step 1 is just R^2 for the predictors at this step. $F\Delta R^2$ is the F ratio for the test of significance of the change in variance accounted for with each new step in the regression model. βs are standardized partial regression coefficients from the relevant step in the model. Bold entries indicate a significant effect. Total R^2 for the model is 0.351, or accounts for 35.1% of the variance in binge drinking frequency.

* p < .05; ** p < .01; *** p < .001.

Table 9. Hierarchical Regression Models with Impulsivity Traits as Predictors of SMAST Scores

				Step 1		Step 2		Step 3	
Step in regression model	ΔR^2	$F\Delta R^2$	*df*	β	*p* value for β	β	*p* value for β	β	*p* value for β
Step 1: Sex	.000	.026	**71**	.019	.872	.055	.663	.020	.874
Step 2: Pun Sensitivity	.017	.584	**69**			.120	.327	.223	.114
Rew Sensitivity						.049	.697	-.108	.469
Step 3: UPPS-P SS	**.163***	**2.535***	**64**					.069	.663
UPPS-P NU								.050	.785
UPPS-P Per								.035	.814
UPPS-P PU								.093	.594
UPPS-P Pre								**.346**	**.018**

Note. SMAST=Short Michigan Alcoholism Screening Test, Pun = Punishment, Rew = Reward, SS = Sensation Seeking, NU = Negative Urgency, Per = Perseverance, PU = Positive Urgency, Pre = Premeditation. Sex was dummy coded with 0 = male, 1 = female. ΔR^2 is the change in variance accounted relative to the previous step in the regression. By definition ΔR^2 for Step 1 is just R^2 for the predictors at this step. $F\Delta R^2$ is the F ratio for the test of significance of the change in variance accounted for with each new step in the regression model. βs are standardized partial regression coefficients from the relevant step in the model. Bold entries indicate a significant effect. Total R^2 for the model is 0.180, or accounts for 18% of the variance in SMAST scores.

* p < .05; ** p < .01; *** p < .001.

Table 10. Hierarchical Regression Models with Impulsivity Traits, BART scores, and Alcohol Valence as Predictors of Binge Drinking Frequency

				Step 1		Step 2		Step 3		Step 4	
Step in regression model	ΔR^2	$F\Delta R^2$	*df*	β	*p* value for β	β	*p* value for β	β	*p* value for β	β	*p* value for β
Step 1: Sex	.015	1.099	**71**	-.123	.298	-.067	.523	-.075	.467	.022	.827
Step 2: Sensation Seeking	**.223*** **	**20.503*** **	**70**			**.476**	**.000**	**.419**	**.000**	**.342**	**.001**
Step 3: Adjusted Average Pump from BART	**.052***	**5.082***	**69**					**.235**	**.027**	.172	.094
Step 4: Alcohol Valence	**.080** **	**8.599** **	**68**							**.321**	**.005**

Note. BART=Balloon Analogue Risk Task. Sex was dummy coded with 0 = male, 1 = female. ΔR^2 is the change in variance accounted relative to the previous step in the regression. By definition ΔR^2 for Step 1 is just R^2 for the predictors at this step. $F\Delta R^2$ is the F ratio for the test of significance of the change in variance accounted for with each new step in the regression model. βs are standardized partial regression coefficients from the relevant step in the model. Bold entries indicate a significant effect. Total R^2 for the model is 0.370, or accounts for 37% of the variance in binge drinking frequency.

* p < .05; ** p < .01; *** p < .001.

Table 11. Hierarchical Regression Models with Impulsivity Traits as Predictors of Eating Concerns

				Step 1		Step 2		Step 3	
Step in regression model	ΔR^2	$F\Delta R^2$	*df*	β	*p* value for β	β	*p* value for β	β	*p* value for β
Step 1: Sex	.024	1.516	**61**	.156	.223	**.268**	**.044**	**.285**	**.034**
Step 2: Pun Sensitivity	**.109***	**3.703***	**59**			**.305**	**.018**	.199	.177
Rew Sensitivity						.132	.306	-.123	.439
Step 3: UPPS-P SS	.149	2.238	**54**					.132	.395
UPPS-P NU								**.529**	**.006**
UPPS-P Per								.057	.694
UPPS-P PU								-.104	.576
UPPS-P Pre								-.130	.378

Note. Pun = Punishment, Rew = Reward, SS = Sensation Seeking, NU = Negative Urgency, Per = Perseverance, PU = Positive Urgency, Pre = Premeditation. Sex was dummy coded with 0 = male, 1 = female. ΔR^2 is the change in variance accounted relative to the previous step in the regression. By definition ΔR^2 for Step 1 is just R^2 for the predictors at this step. $F\Delta R^2$ is the F ratio for the test of significance of the change in variance accounted for with each new step in the regression model. βs are standardized partial regression coefficients from the relevant step in the model. Bold entries indicate a significant effect. Total R^2 for the model is 0.282, or accounts for 28.2% of the variance in eating concerns.

* p < .05; ** p < .01; *** p < .001.

Table 12. Means and Standard Deviations for Stroop Condition Mean Reaction Times (MRT)				
Neutral MRT	**Negative MRT**	**Positive MRT**	**Food MRT**	**Alcohol MRT**
670.09 (105.09)	691.15 (104.18)	700.10 (117.63)	677.95 (111.99)	663.04 (105.18)

Note. N = 73. The values are in milliseconds.

Relationships between Binge Drinking and Binge Eating with Facets of Impulsivity, Reinforcement Sensitivity and Attentional Bias

Two commonly occurring behaviors among university students are binge eating and binge drinking. Binge drinking is defined by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) as drinking enough to raise the blood alcohol concentration to 0.08 gram percent or above, which is roughly equivalent to the average male having five or more standard drinks with any kind of alcohol within a two hour period, and for the average female four or more drinks within a two-hour period (NIAAA, 2004). Binge eating, as defined by the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5), is eating an amount of food that is definitely larger than what most people would eat under similar circumstances in a discrete period of time, such as within a two-hour period (American Psychiatric Association, 2013). Both types of behavior involve a loss of control, perhaps indicative of one or more of several impulsive personality traits (Dawe & Loxton, 2004). There has been increasing recognition, however, that impulsive traits are heterogeneous and may reflect multiple traits each related to different underlying biological systems (Cross, Copping, & Campbell, 2011). Although some of these impulsive traits have been related to different types of binge behavior, it is still unclear which are common to both, specific to one, and uniquely related independent of other overlapping traits, which is the reason for the present study.

Literature Review

The 2012 National Survey on Drug Use and Health reported that young adults aged 18-22 who are enrolled full-time in college were more likely than their part-time college peers and peers not enrolled in college to report binge drinking (Substance Abuse

and Mental Health Services Administration, 2013). Sixty-three percent of female and 86% of male U.S. college students reported binge drinking within the last two weeks, and about 50% of both genders reported binge eating (Kelly-Weeder, 2009). Furthermore, between 30-40% of both genders reported engaging in both binge behaviors, indicating the significance of these phenomena on college campuses. Eisenberg, Nicklett, Roeder, and Kirz (2011) examined students at a midwestern university and also found a substantial proportion of students reporting symptoms of eating disorders, specifically 50.9% of undergraduate females, and 21.8% of undergraduate males. Further, they discovered a 3 to 1 female to male ratio for positive screens of eating disorders. The findings of both studies indicate the importance of examining both genders when assessing each binge type. Individuals who do not meet the full criteria for an eating disorder with bingeing or alcohol use disorder are still important to assess as the binge behaviors can lead to further consequences, including academic, physical, and health consequences (Wolburg, 2001).

Understanding what factors are common to both types of behavior may inform both how we classify binge behaviors and how we develop interventions that could help both conditions. For example, hierarchical models of major disorders, such as externalizing and internalizing syndromes, have received much recent attention in the last two decades (Berg, Latzman, Bliwise, & Lilienfeld, 2015). These models identify common and syndrome specific influences that may greatly inform our understanding of etiology. It is possible that bingeing behavior may be best understood in terms of common and specific influences. Given the loss of control and lack of premeditation

related to bingeing, impulsivity is a strong candidate for being a common influence (Harris, 2013).

Impulsivity and Binge Behavior

Trait level impulsivity has been shown to be associated with eating behaviors and alcohol consumption; as the trait increases, so does alcohol consumption and eating disorder symptomology, as well as consequence of the behaviors (Acton, 2003; Dick et al., 2010; Fischer, Settles, Collins, Gunn, & Smith, 2012). Researchers assessing levels of impulsivity in binge eaters have found that this trait is heightened and strongly associated with engagement in binge eating (Claes, Vandereycken, & Vertommen, 2005; de Zwaan et al., 1994). Researchers assessing binge drinking among college students similarly have found higher levels of impulsivity as compared to non-binge drinkers, and impulsivity traits to be linearly associated with binge frequency (Carlson, Johnson, & Jacobs, 2010; Goudriaan, Grekin, & Sher, 2007; Marczinski, Combs, & Fillmore, 2007). Impulsivity may be the common factor that accounts for the development of impulsive approach behavior (Claes et al., 2005; Kane, Loxton, Staiger, & Dawe, 2004). Implications of such research would suggest that if one enters treatment and only alcohol use is addressed, the patient may reduce or stop drinking, but they may then engage in other impulsive activities such as binge eating or self-harm (Lacey & Evans, 1986). This is because instead of dealing with the underlying cause of the behavior, the professionals are solely working to fix the presenting problem. While much research has examined impulsivity, one problem is that there has been a lack of agreement on what an impulsive personality involves (Cross et al., 2011).

Impulsivity itself is a broad term and has been conceptualized in a multitude of ways and at times, as Whiteside and Lynam (2001) have noted, inconsistently. For instance, the number of proposed subdimensions that compose impulsivity has ranged from as few as two to as many as 15 (Kirby & Finch, 2010). In order to clarify the dissociable facets of impulsivity, Whiteside and Lynam (2001) conducted a factor analysis of commonly used measures of impulsivity and the Five Factor Model of personality. A four-factor solution was revealed, including: 1) Negative Urgency, the tendency to act rashly when facing distress, 2) Lack of Premeditation, the tendency to act without thinking, 3) Lack of Perseverance, the inability to remain focused on a task, and 4) Sensation Seeking, the tendency to seek out novel and thrilling experiences. From this, the UPPS Impulsive Behavior Scale was created, which is a self-report measure that includes scales to measure each of the facets. Later, another "P" was added to the measure for Positive Urgency, the tendency to act rashly when experiencing very positive emotion (Cyders et al., 2007).

The specific facets have been investigated within binge eating and binge drinking, and Negative Urgency stood out and predicted these behaviors in individuals (Dir, Karyadi, & Cyders, 2013; Fischer et al., 2012; Fischer, Smith, Annus, & Hendricks, 2007). Additionally, a meta-analysis by Coskunpinar, Dir, and Cyders (2013) found a relationship between Negative Urgency and these behaviors, and Ferriter and Ray (2011) found Negative Urgency to be a risk factor for different types of binge behaviors. Furthermore, the DSM-5 states that "the most common antecedent of binge eating is negative affect" (p. 351). The other four facets have been found to be associated with binge drinking, but not consistently with binge eating (Coskunpinar et al., 2013). A study

specifically examining the roles of the facets of impulsivity in addictive behaviors, such as problem drinking and binge eating, found that Negative Urgency relates to all of these behaviors as well as the problems associated with them, but that Sensation Seeking and Lack of Premeditation were more linked to the frequency of drinking than the other facets (Fischer & Smith, 2008). Therefore, different impulsivity facets are related to different DSM symptoms of binge eating and binge drinking, as well as the problems associated with them.

Although the UPPS-P has been a major step forward in clarifying the nature of impulsive traits, factor and principal components analyses subsequent to the creation of the UPPS have repeatedly suggested that three of the major, dissociable dimensions involve (high) Reward Sensitivity, (low) Punishment Sensitivity, and a kind of impulsivity due to a lack of Effortful Control, or Rash Impulsivity (e.g., Caseras, Avila, & Torrubia, 2003; Miller, Joseph, & Tudway, 2004; Franken & Muris, 2006; Sharma, Markon, & Clark, 2014; Thomson & Carlson, 2014). The Urgency, Perseverance, and Premeditation scales are specifically measuring Effortful Control (Cross et al., 2011) and reflect Rash Impulsivity (Thomson & Carlson, 2014). The UPPS-P does not appear to capture all of the variance in under-controlled behavior due to Reward and Punishment Sensitivity (Carlson, Pritchard, & Dominelli, 2012), so a full understanding of how impulsive traits relate to binge behavior needs to take these traits into account as well as the UPPS-P facets.

Reinforcement Sensitivity Theory

Reward and Punishment Sensitivity are accounted for by the Reinforcement Sensitivity Theory (RST; Corr, 2004). The RST states that three motivational systems

play a role in the onset of impulsive behavior. The first system is the behavioral approach system (BAS), which activates approach behavior and positive valence emotional responses to appetitive stimuli (Torrubia, Avila, Molto, & Caseras, 2001). The second system is the fight-flight-freeze system (FFFS), which facilitates reactions to aversive stimuli, be they conditioned or unconditioned (Corr, 2004). The FFFS is also responsible for avoidance and escape behaviors and is associated with the emotion of fear. The behavioral inhibition system (BIS) is responsible for resolving goal conflict between the BAS and the FFFS. The activation of the BIS can create anxiety and subjectively is experienced as worry, rumination, and a sense of danger or loss. In relating the RST with the UPPS-P traits, the BIS represents a sensitivity to extreme novelty, which would be opposite of Sensation Seeking, and the BAS partially overlaps with Sensation Seeking. While Reward Sensitivity reflects BAS functioning, Punishment Sensitivity is related to the combined FFFS/BIS functioning, and reduced Punishment Sensitivity may lead to seemingly impulsive or reckless behavior because of a lack of fear of potential negative consequences. Given their potential role in under-controlled behavior, researchers have examined the roles of Reward and Punishment Sensitivity in motivating binge eating and drinking.

Harris (2013) stated that food is associated with reward-related brain areas such that food consumption, like alcohol use, can also produce a variety of desirable effects, such as satiety and euphoria. Therefore, people who are high in Sensitivity to Reward may be more drawn to food. Reward Sensitivity has been suggested to increase vulnerability to binge eating, and a hypothesis is that it may play a part in the initiation of cravings and desire to binge, but this hypothesis does not have much empirical support

(Dawe & Loxton, 2004). Sensitivity to Reward has been moderately related to binge drinking (Tapper, Baker, Jiga-Boy, Haddock, & Maio, 2015; Katz, Fromme, & D'Amico, 2000). Those with a higher Sensitivity to Punishment consume less alcohol, possibly because they are more attentive to the negative consequences of excessive drinking and therefore drink less (Tapper et al., 2015). While self-reports measuring the RST have substantial criterion validity, as with all self-reports, they are not without limitations. These limitations include being prone to such measurement error as response bias, impression management styles, and vulnerability to inattention (Rogers & Cruise, 2000). In order to measure a different portion of the variance in problem behavior, it would be useful to measure the RST in a different way (Sharma, Markon, & Clark, 2014).

Behavioral Tasks

It is important to measure impulsivity through behavioral tasks in order to compare measures of the same constructs that do not share the same sources of measurement variance to see if they converge. Behavioral measures generally considered to be influenced by Effortful Control, Reward Sensitivity, and Punishment Sensitivity have been receiving increasing attention. Being more sensitive to immediate rewards or higher in Sensation Seeking can result in impulsive choices and behavior outcomes, which could lead to maladaptive decision-making or difficulty delaying gratification. One task that measures impulsive choice is the Balloon Analogue Risk Task (BART), which involves participants pumping up balloons as large as possible without popping them, and each successful pump earns them money. The adjusted average number of balloon pumps made on the BART indicates riskier decision-making. Risk behavior as measured by the BART correlates with real-world risk behavior, such as

problematic/hazardous drinking, polydrug use, and pathological gambling (Lejuez et al., 2002). It also correlates with trait measures of risk-taking propensity, such as those measuring impulsivity, and specifically, Sensation Seeking. In particular, the adjusted average number of balloon pumps made on the BART was higher for those who engaged in binge drinking. While impulsive choice is one behavioral way to measure impulsivity, a further method is to examine cognitive processing with interference due to approach or avoidance relevant stimuli (Williams, Mathews, & MacLeod, 1996).

Investigators interested in cognitive accounts of emotion have used a variant of the familiar color-naming Stroop interference task with negative affect words instead of color words (Williams et al., 1996). The greater a stimulus engages attention, or the more salient it is, the more interference it provides for the color identification task, and the longer the reaction time is for participants (Williams, Watts, MacLeod, & Mathews, 1997). The emotional variant of the Stroop task assesses the interplay among Reward Sensitivity and Punishment Sensitivity. The negative affect words may produce more interference for those who are higher in Punishment Sensitivity and the positive affect words may produce more interference for those higher in Reward Sensitivity. Because of their ability to measure attentional bias due to emotion, such variants of the Stroop task have been used to study both eating and drinking habits (Bruce & Jones, 2004; Cox, Fadardi, & Pothos, 2006; Fadardi & Bazzaz, 2011; Johansson, Carlbring, Ghaderi, & Andersson, 2008).

Previous studies using the emotion Stroop task have found that individuals who engage in heavy alcohol use or disordered eating make more incorrect responses on the Stroop task when faced with alcohol-related or food-related words, respectively (Cox et

al., 2006; Johansson et al., 2008). Other studies have instead focused on using colored picture stimuli to engage emotions rather than using words, which increases the similarity between the lab conditions and the real world (e.g., Bruce & Jones, 2004; Fadardi & Bazzaz, 2011). Bruce and Jones' study used alcohol-related objects and scenes as the stimuli and found an attentional bias due to the picture type, suggesting that alcohol-related pictures can cause interference in the task. In particular, they found that heavy social drinkers, as compared to light social drinkers, displayed an attentional bias towards alcohol-related stimuli, indicating that attentional biases can be found between levels of social drinking and not just between social drinkers and those who abuse or are dependent on alcohol. Studies have not yet used a Pictorial Stroop task using alcohol and food related pictures to assess both binge eating and binge drinking at the same time, and this is important in order to assess the attentional bias for individuals engaging in a specific binge type or both.

The present study will use alcohol and food related stimuli, in addition to highly pleasant and unpleasant imagery independent of food or alcohol, in a sample of college students. There will be a comparison between the alcohol and food stimuli to the positive and negative valence pictures in terms of reaction times. This is in order to see if the type of picture being observed is unique in producing an interference effect as compared to simply being positive or negative in nature. This will inform whether binge eaters and drinkers exhibit a hyperresponsivity to emotionally valenced stimuli in general, or whether it is specific to stimuli containing alcohol or food content (Field & Cox, 2008).

In the present study, we examined seven subdimensions of impulsivity in a sample of undergraduate students through the use of two self-report measures: the UPPS-

P and the Sensitivity to Punishment, Sensitivity to Rewards Questionnaire (SPSRQ), as well as through behavioral measures (the BART and Pictorial Stroop task). All three dimensions are covered such that the four facets of Negative Urgency, Positive Urgency, Lack of Premeditation, and Lack of Perseverance relate to Effortful Control, Sensation Seeking and Reward Sensitivity relate to heightened Reward Sensitivity, and the final dimension of low Punishment Sensitivity is measured. We assessed frequency and quantity of both binge eating and drinking, as well as the negative consequences associated with them. Problematic involvement of alcohol use and disordered eating can lead to consequences that are different from frequency of engagement (Fischer & Smith, 2008), which demonstrates the importance of the inclusion of measures of consequences related to bingeing. We predicted that those who engage more frequently in binge drinking would have a higher average number of pumps on trials when the balloon does not pop, suggesting higher risk taking. On the Stroop task, participants who binge drink more frequently were predicted to have a longer reaction time due to attentional bias to alcohol-related pictures, and likewise with those who binge eat more frequently with food-related pictures relative to neutral pictures. Furthermore, we predicted that those who scored higher on Sensitivity to Punishment would have a longer reaction time for the negative valence pictures, and those who scored higher on Sensitivity to Reward would have a longer reaction time for the positive valence pictures.

Common correlates across both types of bingeing were predicted to include Negative Urgency and heightened Reward Sensitivity (Coskunpinar et al., 2013; Dawe & Loxton, 2004; Tapper et al., 2015). Specific correlates for binge drinking were predicted to be Sensation Seeking and Lack of Premeditation (Coskunpinar et al., 2013; Fischer &

Smith, 2008; Littlefield, Stevens, & Sher, 2014), and correlates for negative consequences associated with drinking were predicted to include all five facets of the UPPS-P (Cyders, Flory, Rainer, & Smith, 2009; Shin, Hong, & Jeon, 2012). For binge eating, a specific correlate was predicted to be Punishment Sensitivity (i.e., Harrison, Treasure, & Smillie, 2011; Loxton & Dawe, 2007).

Method

Participants

This study involved 75 college student participants (62.7% were females) between the ages of 18 and 22 (mean age of 19.53, SD=1.21) from a medium-sized university in the Great Lakes region. Demographic information can be found in Tables 1 and 2. The sample was 76.2% European American, 10.7% African American, 5.6 % East Asian, 3.6% Hispanic American, 2.1% Asian American, 1.2 % First Nations/Native American/American Indian 1.2% Indian-South Asian, and 1.2 % Middle Eastern. Some participants identified with multiple ethnic groups. The participants were recruited through use of a website advertising available studies within the psychology department (SONA software), through flyers hung around the campus, through emails sent to psychology majors and minors, and through Facebook. The requirements to participate were as follows: between the ages of 18 and 22, a student at the University, right-handed, English speaking for at least ten years, and not be color blind. The students were offered a $10 Amazon gift card for participating. Data was collected during both fall and spring semester of the 2015-2016 academic year.

Procedure and Measures

All procedures were approved by an institutional review board and informed consent was obtained from each participant. In the lab, one by one the participants completed the Edinburgh Handedness Questionnaire (see Appendix A), as well as a series of online questionnaires through Qualtrics (see Appendix B) and three computer behavioral tasks. A white noise generator was used to mask extraneous noise. During the online questionnaires, the Pictorial Emotion Stroop Task and the Stroop Slide Ratings task, the experimenter was not in the room. A specific self-report measure that was used was the 21-item Depression, Anxiety, and Stress Scale (DASS-21; see Appendix C) which was used to assess whether the sample had variability that was clinically relevant to stress as it was known that this sample would be restricted in range and non-clinical in nature.

Bingeing behaviors and problems.

Bingeing and Alcohol Use. Multiple questions recommended by the National Institute on Alcohol Abuse and Alcoholism (NIAAA; 2003; see Appendix D) were used to assess alcohol use. Participants were asked how often they drank five (for males) or four (for females) drinks within a two-hour period in the past year, thus capturing the frequency of binge drinking. For each, a drink referred to half an ounce of alcohol, for instance one 12–oz. beer, one 5–oz. glass of wine, or one 1.5–oz. shot of distilled spirits. There is support for the content, criterion, and construct validity of the frequency and quantity of alcohol use questions (Sobell & Sobell, 2003).

Short Michigan Alcoholism Screening Test (SMAST). The SMAST is a 13 dichotomous item measure that screens for alcohol use disorder and alcohol-related problems (Devos-Comby & Lange, 2008; see Appendix E). This measure was used to assess whether the participants feel that their drinking patterns are problematic and whether they have experienced consequences with their drinking in the past. This measure had low internal consistency (α=0.31) in the current study, and lower reliabilities have tended to result with primarily female, nonclinical samples (Shields, Howell, Potter, & Weiss, 2007). This measure has adequate sensitivity (83%) and specificity (87%), and is widely used on college campuses throughout the nation (Devos-Comby & Lange, 2008).

Eating Disorder Diagnostic Scale (EDDS). The EDDS is a 22-item self-report measure that diagnoses Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, and eating pathology (see Appendix F). The response format for this measure was mixed, including yes/no questions and Likert scales to assess the frequency of a behavior. Studies have indicated good test-retest reliability, content validity, criterion validity, convergent validity, and predictive validity of this scale (Stice, Fisher, & Martinez, 2004; Stice, Telch, & Rizvi, 2000). Question 7 on the EDDS was used in this study to assess how frequently participants engaged in binge eating in the past six months.

Eating Disorder Examination Questionnaire (EDE-Q). The EDE-Q uses a 7-point Likert scale and includes four subscales-assessing Restraint, Shape Concerns, Weight Concerns, Eating Concerns-as well as assessing frequency of these behaviors, focusing on the past 28 days (Aardoom, Dingemans, Slof Op't Landt, & Van Furth, 2012; see appendix G). Item 15 asks how often the participant has engaged in binge eating

(without using the actual term). This measure was used because of the different time frame as compared to the EDDS (28 days versus three and six months) and because it asks about the often associated concerns that individuals have when they engage in binge eating. This questionnaire has support for having excellent test-retest reliability, and good convergent and discriminant validity (Bardone-Cone, & Boy, 2007; Berg, Peterson, Frazier, & Crow, 2012; Luce & Crowther, 1999; Reas, Grilo, & Masheb, 2004). The four scales had acceptable internal consistency, with the Restraint scale having an alpha of 0.79, Eating Concern 0.80, Shape Concern 0.86, and Weight Concern 0.81. Overall, this measure has proven useful in screening for eating attitudes and behaviors in the broader population of college students, for both male and female undergraduate students (Rose, Vaewsorn, Rosselli-Navarra, Wilson, & Weissman, 2013).

Personality self-reports.

UPPS-P. The UPPS-P is a self-report measure of impulsivity that includes five facets of impulsivity: Negative Urgency, Lack of Premeditation, Lack of Perseverance, Sensation Seeking, and Positive Urgency (Whiteside & Lynam, 2001; Cyders et al., 2007; see Appendix H). The response format for this measure is a 4-point Likert scale ranging from agree strongly to disagree strongly. The test-retest correlations for all of the scales were 0.81 or higher, and the UPPS-P has been deemed a valid measure for assessing impulsivity traits and their associations with alcohol use (Coskunpinar et al., 2013; Weafer, Baggott, & de Wit, 2013). For this study, the internal consistency ranged from good to excellent, with the Sensation Seeking scale having a Cronbach's alpha of 0.88, for Negative Urgency 0.90, for Lack of Perseverance 0.87, for Positive Urgency 0.95, and for Lack of Premeditation 0.89.

Sensitivity to Punishment, Sensitivity to Reward Questionnaire (SPSRQ). The SPSRQ is a 48 item yes-no response questionnaire based on the RST (Torrubia et al., 2001; see Appendix I). Its two scales (Reward Sensitivity and Punishment Sensitivity) have shown support for construct validity and for being useful in non-clinical populations and eating disordered populations (Beck, Smits, Claes, Vandereycken, & Bijttebier, 2009). The test-retest reliabilities have shown to be acceptable for both scales, and is shown to be higher for the Punishment Sensitivity scale. The scales had good internal consistency, with alpha for the Reward Sensitivity scale being 0.76, and for the Punishment Sensitivity scale 0.81.

Behavioral measures.

Balloon Analogue Risk Task (BART). The BART is an impulsive choice task that was implemented in Millisecond's Inquisit 4 software (2014) where images of balloons appear on a screen and participants are instructed to "pump" the balloons as large possible without popping them (Lejuez et al., 2002). On the screen, the participants see a simulated balloon with a balloon pump, a reset button labeled "Collect $$$," and a label "Total Earned" which lets them know how much total money they have earned throughout the task. Each click on the pump inflates the balloon by 1° (0.3 cm) and increases their amount of money earned by $0.05, but if the balloon is pumped past its individual explosion point, a sound effect similar to a "pop" is generated, all the money in the temporary bank is lost, and the next uninflated balloon appears on the screen. Participants have the option at any time during each trial to stop pumping the balloon and collect their money, which results in the money earned from the current trial being transferred to the permanent bank while a slot machine payoff sound effect plays. There

is a total of 30 trials and the balloons have different probabilities of popping, which is not known by the participant. What is being measured is the average number of pumps on trials when the balloon does not pop. The higher the number of pumps reflects the greater risk the subject is willing to take in order to earn the money. There is support for the incremental validity in that the riskiness exhibited on the BART accounted for significant additional variance in measures of self-reported behaviors beyond that accounted for by demographic information and other risk-related measures (Lejuez et al., 2002). Other studies have found high test-retest reliability correlations (*r*'s ranging from 0.66 to 0.79), and have found that it is relatively resilient to novelty effects, learning effects, habituation, and day-to-day mood fluctuations (Weafer et al., 2013; White, Lejuez, & de Wit, 2008).

Pictorial Emotion Stroop Task. The stimuli for this study involved photographic slides with eight slides from each of five content types: alcohol, food, positive valence, negative valence, and neutral valence. The positive, neutral, and negative pictures, as well some food-related pictures used in this study came from the International Affective Picture System (IAPS; Center for the Study of Emotion and Attention, 2002). Other food and alcohol pictures came from the Normative Appetite Picture System (NAPS) and were selected based on their relevance (Strizke, Breiner, Curtin, & Lang, 2004). Slides were selected based on the IAPS normative ratings of unpleasantness versus pleasantness (called "valence"). Positive slides had to have a rating of 6 or higher on a 9-point scale with 1 indicating extremely unpleasant and 9 is extremely pleasant. The positive pictures involved erotic images of naked or semi-naked opposite-sex couples and scenes of thrilling recreation, money, and animals. Negative slides were required to have valence

ratings less than or equal to 4. The negative images involve threatening or disgusting scenes and images with some including people, and some involving animals and natural disasters. The neutral slides were selected to have ratings between 4.5 and 5.5 (5 being the middle of the valence scale). Valence and arousal ratings was gathered from the participants for each slide. The food-related and alcohol-related slides were not chosen based on arousal ratings, but rather based on their relevance to the task and study at hand. Food and alcohol did not appear in the other valence categories.

The pictures were changed to a red, blue, green, or yellow color by removing the original color and creating the new color versions using Microsoft photo editing. For this study, the participants were instructed to ignore the content of the picture and respond to the color of the stimuli. Each unique image used was presented in blue, red, yellow and green. There were four blocks with 40 trials each, and trials were presented with an opportunity to rest in between each block. There were ten slides of each color per block. Each image appeared once per block and in a different color in each of the blocks. These slide sets were counterbalanced and randomly assigned across blocks. There was a set of 10 practice trials where each stimulus type appeared twice, which also assessed whether the participants were color blind. The stimuli used in the practice were selected using the same criterion as the stimuli in the actual task, although they did not appear in the task. Participants had to obtain an accuracy rating of 80% or higher in order to proceed to the actual task.

The subject was seated in an armchair roughly 41.91 cm away from the monitor screen. The range of visual arc subtended by the stimuli was 51.73° to 88.24°. The task was implemented in either E-Prime 2.0 (39 subjects) or 2.2 (36 subjects) Professional

Version, and the experimenter was not in the room during the actual task in order to allow privacy for the participant while viewing potentially emotional and arousing stimuli. Each trial began with a fixation cross in the center of the screen for 1000 ms, followed by a picture, which remained until the participants responded. The next trial started upon their response. The participants were instructed to hold onto a response box which had a color overlay to indicate which color each button represents. Thirty-nine subjects used the Psychology Software Tools, Inc. Deluxe Serial Response Box and 36 subjects used the Chronos Response Box. The dependent variables focused on are the reaction time interference scores for correct responses, which are the mean response times for the neutral pictures subtracted from the other four picture types. The interference scores are considered measures of attentional bias. Trials with reaction times three standard deviations or more from the subject's mean were eliminated. Errors of commission rates were calculated as percentages.

Stroop Slide Ratings. To assess whether the valence and picture types were effective for the participants and that our slide selections were appropriate, arousal and valence ratings were gathered from the participants following the Stroop task using the same scale and general instructions as was used to create the normative data (Lang, Bradley, & Cuthbert, 2005). This task was implemented in E-Prime using the same response box as was used in the Stroop. First, the full-color version of a picture from the Stroop task was displayed. Then the participants were asked to rate how they felt while viewing the picture using the Self-Assessment Manikin (SAM), which is a continuously varying affective scale ranging from extreme pleasantness to extreme unpleasantness. They were then asked to rate how aroused they felt while viewing the picture using the

SAM that ranged from extreme arousal to completely unaroused. The participants were allowed to mark any of the five figures comprising the scale, or between any two figures which resulted in a nine-point rating scale. The response box was used to move an X across the SAM and lock in their rating. They were able to shift back and forth between the smaller version of the picture which was above the SAM, and the full size picture as much as they wanted. The valence and arousal SAMs were presented separately for each slide, with arousal following valence. Higher ratings indicated higher pleasantness and arousal.

Results

Of the initial 77 participants to complete the surveys, 75 individuals were included in the analyses after applying the exclusion criteria (i.e., age and English speaking). Most of the dependent variables were positively skewed, and therefore a constant of one was added to all scores, and then the natural log transformation was taken for the binge eating and binge drinking variables, as well as for the consequence measures in order to create non-zero positive scores, as scores of zero were undefined. There was fair variation of bingeing behaviors in this sample, as 74.7% reported binge drinking on at least one day in the past 12 months, 52.1% reported binge eating at least one day per week in the past 6 months, 47.9% reported binge eating at least once per week in the past 3 months, and 31.5% reported binge eating on at least one day in the past 28 days.

The body mass index (BMI) of the participants were calculated as part of the EDDS. According to the National Institute of Health (2015) a BMI below or equal to 18.5 qualifies as underweight, between 18.5 and 24.9 is normal weight, between 25 and

29.9 is overweight, and 30 and above is obese. The mean and standard deviation BMI's for this sample are exhibited among other demographic information in Table 2. For this sample, 4.3% qualified as underweight, 46.4% normal weight, 33.3% overweight and 15.9% obese. Additionally the severity ranges for the three scales of the DASS-21 are presented in Table 1. There did appear to be variability, as a proportion of participants were in the moderate to extremely severe category. The descriptive statistics for the outcome and impulsivity trait variables are displayed in Table 3.

Slide Ratings

A mixed model ANOVA was conducted to see if there was an effect for condition, or type of stimuli, on the valence ratings of the stimuli used in the Stroop task. This was important to assess in order to see whether the various stimuli in the Stroop task were working as intended. The within subject factor was the condition, or the type of stimuli, which had five levels (neutral, positive, negative, food, and alcohol). The between subject factor was sex, which had two levels (male and female). There was an interaction between condition and sex, $F(3.059, 217.176) = 4.49$, $p = .004$ using the Greenhouse-Geisser correction due to sphericity having been violated. Males tended to rate stimuli as more positive, with the exception of the food stimuli. There was a condition main effect, $F(3.059, 217.176) = 162.93$, $p < 0.001$. A paired samples t-test was completed to find which conditions were significantly different from one another, and the only pair of conditions that did not have a significant difference was between the positive and food conditions. The significant valence rating differences were as expected: negative stimuli were rated as less positive than all other stimuli, and positive stimuli were rated as more pleasant than all other stimuli. Food stimuli were rated more

positively than neutral and alcohol stimuli, and alcohol stimuli were rated more positively than neutral stimuli. The means and standard deviations for the valence ratings can be found in Table 6.

The same process was used to determine if there was an effect for condition on the arousal ratings of stimuli. The same within and between subject factors were used. There was not a significant interaction, but there was a condition effect, $F(3.302, 234.424) = 56.42$, $p < 0.001$ using the Greenhouse-Geisser correction. The paired samples t-tests revealed significant differences between all pairs except between the food and negative stimuli. Positive pictures were rated as more arousing than all other picture types, with negative stimuli having been rated as more arousing than neutral, food and alcohol stimuli. Food and alcohol pictures were rated as more arousing than neutral pictures, and food pictures had higher arousal ratings than alcohol pictures. The means and standard deviations for the arousal ratings can be found in Table 7.

Stroop

A mixed model ANOVA was conducted in order to test whether the manipulation of stimuli type resulted in differences in reaction times (RT) on the Stroop task. The within subject factor was the condition, or the type of stimuli, which again had five levels (neutral, positive, negative, food, and alcohol). The between subject factor was sex which had two levels (male and female). There was not a significant interaction, or no significant sex differences for mean RT, but there was a significant condition main effect ($F(4, 284) = 14.83$, $p < 0.001$). Paired samples t-tests revealed significant differences between several conditions. RTs for negative stimuli were slower than those for the neutral and alcohol stimuli, with the same pattern in RTs for positive stimuli as compared

to neutral and alcohol stimuli. Food stimuli RTs were longer than RTs for alcohol stimuli. The means and standard deviations for each condition's reaction times can be found in Table 12.

Correlations

The dependent/outcome variables are the binge eating and drinking frequencies, the eating concerns global score, and the drinking consequences scores. Correlations were conducted for all dependent variables with impulsivity traits, the adjusted average pump scores from the BART, interference scores from the Stroop, and average valence and arousal ratings from the Slide Ratings task. All correlations are reported, with partial correlations controlling for sex reported if substantially different from the bivariate correlations.

Zero-order correlations.

The zero-order correlations for impulsivity traits, the binge frequency outcome variables and the consequence outcome variables are exhibited in Table 3. Correlations for each sex independently are displayed in Table 15 in Appendix J. Higher EDE-Q global scores of eating concerns were associated with higher binge eating frequencies (r = .353, p = .005), as well as with higher levels of Punishment Sensitivity (r = .260, p = .039) and Negative Urgency (r = .396, p = .001). As binge eating frequency increased, so did Negative Urgency (r = .299, p = .010) and Lack of Perseverance (r = .302, p = .009). SMAST scores tended to be higher with increased levels of Positive Urgency (r = .236, p = .043) and Lack of Premeditation (r = .354, p = .002). After controlling for sex, higher levels of Negative Urgency became more likely with higher SMAST scores (r = .233, p =

.047). Higher frequencies of binge drinking were associated with higher levels of Reward Sensitivity (r = .255, p = .029), Sensation Seeking (r = .456, p < .001), Positive Urgency (r = .327, p = .005) and Lack of Premeditation (r = .324, p = .005), as well as with lower levels of Punishment Sensitivity (r = -.321, p = .006). After controlling for sex, the correlation with Reward Sensitivity was no longer significant.

Zero-order correlations were calculated for the BART adjusted average pump count, the Stroop RT and error-rate interference scores, and the outcome variables as well as with the impulsivity traits. These are shown in Tables 4 and 5. There were no significant correlations among the outcome variables and RT or error-rate interference scores on the Stroop. Higher levels of Negative Urgency, Lack of Perseverance, and Reward Sensitivity was associated with making fewer errors on the positive stimuli as compared to the neutral stimuli (r = -.259, p = .027; r = -.331, p = .004; r = -.239, p = .042, respectively), but all but Lack of Perseverance were no longer significant after controlling for sex. Due to the possibility of losing important variance accounted for by the emotional salience of the stimuli, a correlation table of the single condition reaction times and error rates as correlated with the dependent variables and the impulsivity traits can be found in Appendix J. For the BART, higher binge drinking frequencies were associated with higher adjusted average pumps (r = .334, p = .004). With the impulsivity traits, higher levels of Sensation Seeking, Positive Urgency, and Lack of Premeditation correlated with higher BART scores (r = .235, p = .045; r = .294, p = .012 and r = .264, p = .024, respectively). After conducting partial correlations controlling for sex, Sensation Seeking no longer had a significant association with the BART scores.

Correlations were calculated for the valence and arousal slide ratings with the outcome variables and the impulsivity variables. These correlations are displayed in Tables 6 and 7. The higher participants scored on the global eating concerns scale, the more positive they tended to rate neutral slides (r = .288, p = .022). Those who reported a higher binge drinking frequency had a tendency of rating both positive stimuli (r = .254, p = .030) and alcohol stimuli (r = .467, p < .001) as more positive. The valence ratings for positive stimuli typically were more positive for those with higher levels of Sensation Seeking (r = .407, p < .001), Negative Urgency (r = .275, p = .019), Positive Urgency (r = .377, p = .001), and Reward Sensitivity (r = .332, p = .004). The valence ratings for alcohol stimuli also tended to be more positive with those scoring higher on Sensation Seeking (r = .322, p = .005), Negative Urgency (r = .311, p = .007), Positive Urgency (r = .427, p < .001) and Reward Sensitivity (r = .394, p = .001). Furthermore, those higher in Positive Urgency tended to rate negative imagery as more positive (r = .237, p = .044).

For the arousal ratings, both positive and alcohol stimuli were rated as more arousing for those reporting higher levels of binge drinking frequency (r = .325, p = .005 and r = .531, p < .001, respectively). Positive stimuli were also rated as more arousing by those higher in Sensation Seeking (r = .331, p = .004), Negative Urgency (r = .306, p = .008), Positive Urgency (r = .394, p = .001) and Reward Sensitivity (r = .396, p = .001). Arousal ratings for alcohol stimuli were higher for those with higher levels of Sensation Seeking (r = .350, p = .002), Negative Urgency (r = .270, p = .021), Positive Urgency (r = .398, p < .001), and Reward Sensitivity (r = .382, p = .001), and lower for those higher in Punishment Sensitivity (r = -.240, p = .041). Neutral stimuli were rated as

less arousing for those higher in Punishment Sensitivity (r = -.231, p = .049) and more arousing for those higher in Reward Sensitivity (r = .269, p = .022). Lastly, those who scored higher in Positive Urgency tended to rate food stimuli as more arousing (r = .262, p = .025).

Regression

Binge drinking.

Regression analyses were conducted with binge drinking frequency and SMAST scores in order to determine if unique contributions were being made by the impulsivity traits in explaining the variance in these outcomes. The first step involved entering sex, while the second step involved entering the Punishment and Reward Sensitivity scales. The third and final step involved entering the UPPS-P traits. After the second step for binge drinking frequency, there was a significant amount of variance accounted for, ΔR^2 = .183, $F(2, 69) = 7.87$, p = .001 (see Table 8). Lower levels of Sensitivity to Punishment and higher levels of Sensitivity to Reward were significantly associated with higher levels of binge drinking. There was also a significant amount of variance accounted for after step three, ΔR^2 = .153, $F(5, 64) = 3.02$, p = .017, but at that step Sensation Seeking was the only trait added that contributed a significant amount of variance for binge drinking frequency (p = .028), and the SPSRQ scales became non-significant. The significant relation was between higher levels of Sensation Seeking and higher frequencies of binge drinking. For the SMAST scores, only the third step added significant variance to the model with ΔR^2 = .163, $F(5, 64) = 2.54$, p = .037 (see Table 9). In this step, higher levels of Lack of Premeditation had a significant contribution to higher SMAST scores (p = .018).

Due to the unique variance accounted for by Sensation Seeking in binge drinking, as well as the significant correlations of the adjusted average pump scores from the BART and the average alcohol valence ratings with binge drinking, we added all three of these factors into a regression model following sex. The regression outcome can be found in table 10. In step 2, Sensation Seeking added significant variance to the model ($\Delta R^2 = .223$, $F(1, 70) = 20.50$, $p < .001$). In step 3, the adjusted average pump counts from the BART increased explained variance ($\Delta R^2 = .052$, $F(1, 69) = 5.08$, $p = .027$), as well as did the valence ratings for alcohol stimuli in step 4 ($\Delta R^2 = .080$, $F(1, 68) = 8.60$, $p = .005$). This demonstrates that higher frequencies of binge drinking can be explained in part by higher levels of Sensation Seeking, higher adjusted average pump counts on the BART, and more positive ratings of alcohol stimuli.

Binge eating.

Regression analyses were conducted with binge eating frequency and the eating concerns global score from the EDE-Q to determine which traits (if any) explain variance in these outcomes. Again, the first step involved entering sex, with the second step entering the Punishment and Reward Sensitivity scales and the third step entering the UPPS-P traits. The binge eating frequency item did not have any significant variance accounted for in the model with the addition of the three steps (not tabled). For eating concerns, the second step added a significant amount of variance accounted for, with $\Delta R^2 = .109$, $F(2, 59) = 3.70$, $p = .031$ (see Table 11). A higher level of Punishment Sensitivity provided significant variance in accounting for higher levels of eating concerns ($p = .018$).

Discussion

The purpose of the present study was to assess a novel Pictorial Emotion Stroop Task for its validity with the study, and to find out which subdimensions of impulsivity accounted for unique variance in binge eating and binge drinking as well as to find out which are common correlates for both behaviors. This was done in order to gain insight into what the underlying personality risk is for engaging in either binge eating or binge drinking, or both concurrently. From this information, new treatments may be better tailored to individuals who engage in these behaviors, and prevention tactics can be developed early on to prevent negative outcomes associated with the binge behaviors. For this particular study, the percentage of students who endorsed binge drinking at least once in the past 12 months was higher than the percentage found on a national survey in 2012 for binge drinking in the past month (74.7% versus 40.1%; Substance Abuse and Mental Health Services Administration, 2012). For binge eating, the prevalence for recent bingeing for this study (31.5%) was similar to that found in a separate study of college students (29%; Kelly-Weeder, Jennings, Wolfe, 2012). The findings and implications are discussed below.

Stroop and Slide Ratings

Support was provided for the effectiveness of the manipulation of the type of stimuli used in the Stroop task through the significant condition effects for the Stroop and the slide ratings. There was an interference effect for emotion in general, which demonstrates that the stimuli in the task were working as intended for the study. It was predicted that higher binge drinking frequencies would relate to longer reaction times for the alcohol stimuli compared to neutral, and that higher binge eating frequencies would

relate to longer reaction times for the food stimuli, but there were not any significant correlations among the interference variables and the outcome variables.

The reasoning behind not finding an attentional bias toward food related pictures in those who endorsed higher frequencies of binge eating could be explained in that having current concerns with food and eating is not associated with increases in food attentional bias, but rather a necessary condition to observe a statistically significant difference between food and neutral pictures is having a concurrent clinical diagnosis for an eating-related disorder (Ben-Tovim & Walker, 1991; Long, Hinton, & Gillespie, 1994). The same reasoning could also apply for why we did not find an attentional bias toward alcohol pictures in those who binge drink. A further idea is that because higher levels of Negative Urgency were related to higher frequencies in binge eating, adding a stress component to the Pictorial Emotion Stroop task may lead to more attentional bias when exposed to food stimuli, as individuals may turn to food when they are stressed.

Previous research indicates that even when including the suggested emotional stimuli with the alcohol stimuli, there still have been mixed results in terms of finding an attentional bias (Field & Cox, 2008). A reason for not finding interference could be due to having not matched basic perceptual features of the alcohol-related stimuli and the neutral stimuli (Egeth &Yantis, 1997). These features, such as overall complexity and brightness, can influence the allocation of attention. An additional explanation could be that because the majority of participants do not have current concerns related to their bingeing behaviors, there is not an interference effect (Cox, Fadardi, & Pothos, 2006).

An additional prediction was that those with higher levels of Punishment Sensitivity would have longer reaction times to negative stimuli, and that those with

higher levels of Reward Sensitivity would have longer reaction times with positive stimuli, but there were no significant correlations found to support these hypotheses. Instead, higher levels of Negative Urgency, Lack of Perseverance, and Reward Sensitivity were associated with fewer errors being made on the positive stimuli as compared to the neutral stimuli.

There were significant correlations among the valence and arousal ratings of the Stroop stimuli with the dependent variables and the impulsivity trait variables. Alcohol stimuli were rated more pleasantly when there were higher levels of binge drinking frequency, Sensation Seeking, Negative Urgency, Positive Urgency, and Reward Sensitivity. This is in line with the hypothesis that those who endorse higher frequencies of binge drinking would find alcohol stimuli to be more pleasant than those who binge drink less frequently. Higher arousal ratings for alcohol stimuli were associated with higher frequencies of binge drinking, and higher levels of Sensation Seeking, Negative Urgency, Positive Urgency, and Reward Sensitivity, as well as with lower levels of Punishment Sensitivity. For the food stimuli, there were higher arousal ratings for those who scored higher in Positive Urgency, which was not hypothesized.

Common versus Specific Correlates

Although it was hypothesized that both Negative Urgency and Reward Sensitivity would be common correlates for both binge eating and binge drinking, for this sample, there were no common correlates. Additionally, frequency in binge eating and binge drinking did not correlate with each other. Instead, specific correlates were discovered, such as Negative Urgency and Lack of Perseverance for binge eating, and Sensation Seeking, Positive Urgency, Lack of Premeditation, and Punishment and Reward

Sensitivity for binge drinking. Additionally, the SMAST scores correlated with two of the five predicted UPPS-P traits: Positive Urgency and Lack of Premeditation, with the third trait, Negative Urgency, being gained after controlling for sex. Eating concerns were correlated with Punishment Sensitivity and Negative Urgency. The differential correlates of the two binge types, along with the lack of correlation between the two binge behaviors, suggest that they are on two different hierarchies for impulsive behavior.

The impulsivity traits determined to be correlated with binge eating and binge drinking have previous support and are reasonable. For instance, binge eating correlating with Negative Urgency suggests that when facing extreme distress, individuals may binge eat to make themselves feel better. Once they experience relief after the first experience, this then becomes negatively reinforcing for them, as they engage in binge eating in order to remove their negative feelings (Cyders & Smith, 2008). Due to engaging in binge eating more frequently, they may then develop eating concerns, which could explain the relationship between Negative Urgency and higher endorsement of eating concerns. Binge eating is associated with Lack of Perseverance, and perhaps it is related to Negative Urgency in that when an individual experiences negative emotions, they are focused only on what will reduce their negative experience, which in this case is through binge eating.

Those higher in Sensation Seeking may be more likely to consume higher quantities of alcohol in order to experience positive arousal that is associated with alcohol use, and those higher in Lack of Premeditation may be more likely because they fail to consider the negative consequences of binge drinking, which also helps to explain the relationship between Premeditation and alcohol consequences (Magid, MacLean, Colder,

2007). The relationship between Positive Urgency and binge drinking specifically in college students is not a new finding, as research has found that the risk for increased quantity of consumption may be a function of experiencing an extremely positive mood (Cyders et al., 2009).

Three Dimensions of Impulsivity

Through the regression analyses, the Punishment and Reward Sensitivity scales accounted for 13.3% of the variance in eating concerns. For this sample, binge eating frequency did not have significant variance accounted for by any of the impulsivity traits, while it was predicted that Punishment and Reward Sensitivity, as well as Negative Urgency, would account for variance in this behavior. For binge drinking frequency, Punishment and Reward Sensitivity accounted for 19.8% of the variance after accounting for sex, and with the addition of the UPPS-P traits, 35.1% of the variance was explained. While Reward Sensitivity and Sensation Seeking were predicted to have an effect, Punishment Sensitivity originally was not. For drinking consequences as measured by the SMAST, the model accounted for 18.0% of the variance, with Lack of Premeditation specifically affecting the drinking consequences outcome. This is in line with the hypothesis that the UPPS-P traits would explain variance in SMAST scores, but only one out of five had a significant contribution.

The significant negative correlation between binge drinking and Punishment Sensitivity is in line with the idea that those who are more attentive or fearful of the negative consequences of binge drinking choose to drink less and not engage in binge drinking (Tapper et al., 2015). However, the same relationship was not found for the SMAST scores. Reward Sensitivity was positively correlated with binge drinking,

suggesting that those who binge drink perceive drinking as rewarding, which motivates them to drink.

The added variance by the SPSRQ scales in predicting binge drinking and eating concerns signifies the importance of not solely looking at UPPS-P traits when attempting to understand the relationship between impulsivity and binge behavior, because they do not cover the full realm of impulsivity related to disinhibited behaviors (Carlson, Pritchard, & Dominelli, 2012). The negative correlations between Punishment Sensitivity and binge drinking, and the positive correlations among Reward Sensitivity, Lack of Premeditation, Sensation Seeking and Positive Urgency with binge drinking provide support for binge drinking relating to the three dimensions of impulsivity (lack of Effortful Control, higher approach engagement in rewarding behaviors, and weak avoidance for behaviors that could lead to consequences) that are suggested by multiple factor and principal components analyses. Of the three dimensions, binge eating involves a lack of Effortful Control, as it correlated with Negative Urgency and Lack of Perseverance.

Behavioral Versus Self-Report Measures

The correlations found in this study provide support for the idea that behavioral measures of impulsivity account for variance in bingeing behaviors. As was hypothesized, there was a significant correlation between binge drinking and the adjusted average pump scores on the BART, suggesting that a higher binge drinking frequency is associated with a higher level of risk taking, and this is line with previous studies (Lejuez et al., 2002). Furthermore, Sensation Seeking, Positive Urgency and Lack of Premeditation were also correlated with the BART scores, which is reasonable given that

these traits are also related to frequency of binge drinking. These correlations have also been found in previous studies (Weafer et al., 2013).

Finally, due to the significant correlations among Sensation Seeking, BART scores, and average alcohol valence ratings with binge drinking, a regression analysis was conducted and the overall variance of binge drinking accounted for by this model was 37% (which included sex). This suggests that higher levels of Sensation Seeking, higher risk taking as measured by the BART, and more positive ratings of alcohol stimuli significantly predict higher frequencies of binge drinking. However, after the average alcohol valence ratings were added, the BART scores no longer provided significant variance, suggesting that the variance explained by the two predictors are similar.

Implications

In this study, each impulsivity trait measured correlated with at least one binge or problem measure, suggesting the underlying impulsive personality of those who engage in binge behaviors, and possibly experience consequences from them. A feature that is occasionally associated with those who are impulsive is a focus on immediate rewards versus long-term consequences, which can be a reason for engaging in potentially reckless behavior. Treatment involving teaching individuals to slow down and think through their choices before acting may prove to be beneficial. This could be done through cognitive behavioral therapy, as that involves changing your thoughts so as to change your behaviors. However, there are occasions when people may bypass their thoughts to fill an immediate need or desire.

For instance, the experience of emotion can facilitate action in order to meet the need that was identified by the emotion (Cyders & Smith, 2008). The experience of

intense emotions may lead to a heavier focus on the immediate situation. The action taken may be adaptive, but sometimes it can be risky. Furthermore, the intense emotions tend to interfere with rational decision-making and reduce focus on the long-term goals (Bechara, 2005). The actions in response to the emotion are likely to be immediately reinforcing, either through negative reinforcement in reducing distress, or positive reinforcement and gratifying the urge and maintaining the positive feelings. Due to the reinforcement, people continue to engage in the behaviors. To manage emotion, people may engage in risky behaviors such as binge drinking and binge eating.

Based on the engagement in rash behaviors due to experiencing extreme emotions, it seems that treatment and prevention techniques need to focus on teaching individuals how to tolerate their extreme emotional states without engaging in an immediate behavior that may be rash. Due to the findings in this study, it seems plausible that extreme positive emotions should be the focus for college-age students who engage in binge drinking, and extreme negative emotions for those who engage in binge eating. There is a focus in dialectical behavioral therapy on distress tolerance training which teaches skills to people so that they can engage in more adaptive responses to emotions, such as using distraction, until they are brought back to an emotional frame of mind and they can make more rational decisions while keeping their longer-term goals in mind (Linehan, 1993).

The intervention should focus not only on extreme negative emotions, but also positive emotions, and skills should also focus on teaching individuals how to remember their long-term goals while still being focused on immediate needs and pleasures (Cyders & Smith, 2008). For instance, enjoying pleasurable things in moderation so that you still

receive the immediate gratification, but not to excess so that the action becomes risky. Another idea could be to identify alternative novel and rewarding experiences for those at risk of engaging in risky levels of eating and drinking (O'Connor, Stewart, & Watt, 2009). Lastly, education about the role of emotions in risky behaviors could also be fruitful.

Limitations

Although this study is the first to examine common and specific correlates in binge eating, binge drinking, and the consequences associated with these behaviors through use of self-report measures and behavioral measures, including a novel Pictorial Emotion Stroop task, it is not without limitations. One limitation of this study is that it was conducted on only one campus, and the sample was not particularly diverse. Culture could be a moderator and alter the relationships found in this study, as there are differences in bingeing behaviors among ethnic groups (Carlson, Johnson, & Jacobs, 2010; Harris, 2013). The population in the Midwestern area could differ greatly from other areas and campuses of the country, and therefore the results may not be generalizable. Additionally, there was not a large amount of variance of bingeing behaviors in this sample, which could have affected the results. The results should be replicated with a population-representative sample, or with measures of acculturation to see if it moderates the relationships.

Additionally, there are other possible psychological or non-psychological variables that are related to bingeing that are important to consider as well, but were not covered in this study. For instance, the amount and type of perceived support could affect drinking behavior, as individuals may have beliefs about social drinking norms and

be more likely to binge drink if their peers are (Baer, 2002). A further variable could be expectations about drinking, such that if an individual has positive expectations and believes that having a drink will lead to positive feelings, then they are more likely to engage in binge drinking (Fischer & Smith, 2008).

A further limitation is the use of single items from measures to assess binge eating and binge drinking frequency, which may have reduced the reliability and validity of the items. These items also used differing time frames, with the binge eating items asking about behaviors in the previous 28 days, 3 months and 6 months, and the binge drinking item assessing behaviors in the past 12 months. However, despite this potential limitation, meaningful correlations were still determined.

Lastly, this study has a cross-sectional design, and therefore causal explanations cannot be drawn. It is unknown whether having an impulsive personality leads to binge behaviors, or if one first engages in binge behavior which leads to the development of impulsive traits. This study could be replicated with a prospective design, assessing whether someone who has impulsive traits later develops binge behaviors and consequences or vice versa. A further interesting replication could be one involving manipulating impulsivity (such as the priming task used in Guerrieri et al., 2007), or allowing the participants to eat and/or drink during the experiment and see how that affects the results.

Conclusion

In conclusion, this study attempted to look at common and unique correlates of binge eating and binge drinking with impulsivity traits in a sample of college students, and instead only differential relations were found, which argues against binge eating and

binge drinking being in the same hierarchy of impulsive behaviors. Binge eating was associated with Negative Urgency and Lack of Perseverance, while binge drinking was associated with Sensation Seeking, Positive Urgency, Lack of Premeditation, and Punishment and Reward Sensitivity. Eating concerns were associated with Negative Urgency and Punishment Sensitivity, while consequences connected to alcohol use were associated with Positive Urgency and Lack of Premeditation.

Additionally, evidence was provided for behavioral measures of impulsivity accounting for additional variance in bingeing behaviors. For instance, higher scores on the BART were related to higher frequencies of binge drinking, suggesting that those who binge drink more frequently take more risks. On the novel Pictorial Emotion Stroop task and the slide ratings task, support was provided for the effectiveness of the manipulation of the type of stimuli used through the significant condition effects. There was an interference effect for emotion in general, which demonstrates that the stimuli in the task were working as intended for the study. Furthermore, those who endorsed higher frequencies of binge drinking rated alcohol stimuli as more pleasant and arousing.

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Appendix A

Edinburgh Handedness Inventory

Name_____

Date of
Birth_____Sex_____

Please indicate your preferences in the use of hands in the following activities by *putting + in the appropriate column*. Where the preference is so strong that you would never try to use the other hand unless absolutely forces to, *put* ++. If any case you are really indifferent put + in both columns.

Some of the activities require both hands. In these cases the part of the task, or object, for which hand preference is wanted is indicated in brackets.

Please try to answer all the questions, and only leave a blank if you have no experience at all of the object or task.

	Left	Right
1. Writing		
2. Drawing		
3. Throwing		
4. Scissors		
5. Toothbrush		
6. Knife (without fork)		
7. Spoon		
8. Broom (upper hand)		
9. Striking Match (match)		
10. Opening box (lid)		

i. Which foot do you prefer to kick with?		
ii. Which eye do you use when using only one?		

L.Q.	Leave the spaces blank	DECLE

Appendix B

Typical Day Questionnaire
Version 1.4 – 12/10/2013

ID:_____ **Date:**_____

Now we have some questions for you about things people do that could affect the brainwave measurements we are taking. We want to see how typical today is for you as far as these things are concerned, as well as ask about recent patterns and trends that could affect our measurements.

1a. Please tell us how many ounces of each of the following beverages you have had so far today. To help you estimate the number of ounces use the following reference table by entering the number of drinks you have had of each size?

	8 oz A standard household teacup	**12 oz** ***Tall at Starbucks***	**16 oz** ***Grande at Satrbucks or a can of pop***	**20 oz** ***Venti at Satrbucks or a bottle of pop***
Starbuck's coffee	_____	_____	_____	_____
Other coffee	_____	_____	_____	_____
Espresso	_____	_____	_____	_____
Black tea	_____	_____	_____	_____
Green tea	_____	_____	_____	_____
Other caffeinated tea	_____	_____	_____	_____
Mountain Dew	_____	_____	_____	_____
Coca-Cola	_____	_____	_____	_____
Other pop/soda	_____	_____	_____	_____
Red Bull	_____	_____	_____	_____
Other caffeinated energy drink	_____	_____	_____	_____
Hot chocolate or				

cocoa _____ _____ _____ _____

1b. Please tell us how many ounces of the following beverages **you typically have by this time of day?**

	8 oz A standard household teacup	**12 oz** ***Tall at Starbucks***	**16 oz** ***Grande at Satrbucks or a can of pop***	**20 oz** ***Venti at Satrbucks or a bottle of pop***
Starbuck's coffee	_____	_____	_____	_____
Other coffee	_____	_____	_____	_____
Espresso	_____	_____	_____	_____
Black tea	_____	_____	_____	_____
Green tea	_____	_____	_____	_____
Other caffeinated tea	_____	_____	_____	_____
Mountain Dew	_____	_____	_____	_____
Coca-Cola	_____	_____	_____	_____
Other pop/soda	_____	_____	_____	_____
Red Bull	_____	_____	_____	_____
Other caffeinated energy drink	_____	_____	_____	_____
Hot chocolate or cocoa	_____	_____	_____	_____

1c. How many regular-size bars of chocolate have you had so far **today** (by a bar we mean a regular-size candy bar- please use fractions if need be)?

_____

1d. How many regular-size bars of chocolate do you typically have by this time of day (by a bar we mean a regular size candy bar- please use fractions if need be)?

_____

1e. How many 200 mg tablets of caffeine pills, "No-Doze", Excedrin, or pain-reliever with caffeine have you had so far **today**?

_____

1f. How many 200 mg tablets of caffeine pills, "No-Doze", Excedrin, or pain-reliever with caffeine do you typically have by this time of day?

_____

2a. How many drinks of **alcohol** have you had in the last 24 hours? **(by a drink we mean half an ounce (30 ml) of absolute alcohol (e.g. a 12 ounce/355 ml can or glass of beer or cooler, a 5 ounce/ 150 ml) glass of wine, or a drink containing 1 shot of liquor) Please check one option.**

___ 36 drinks or more
___ 24 to 35 drinks
___ 18 to 23 drinks
___ 12 to 17 drinks
___ 8 to 11 drinks
___ 5 to 7 drinks
___ 4 drinks
___ 3 drinks
___ 2 drinks
___ 1 drink
___ some alcohol but less than one full drink
___ 0 drinks

3a. Are you taking any prescription medication or any other drugs? **Yes / No**

If yes, what are they (if you can not remember what they are, state what they are for?

_____
_____
_____
_____
_____
_____

3c. Have you taken any of these in the last 24 hours? (please circle) **Yes / No**

4a. Have you used any marijuana or other cannabis products in the last 24 hours? **Yes / No**

4b. Have you used any other recreational drugs in the last 24 hours*?* **Yes / No**

If yes, what was it? _____

5a. How many cigarettes have you smoked so far **today**? (please check one)
___ more than 20 cigarettes
___ 18 to 20 cigarettes
___ 12 to 17 cigarettes
___ 8 to 11 cigarettes
___ 5 to 7 cigarettes
___ 4 cigarettes
___ 3 cigarettes
___ 2 cigarettes
___ 1 cigarette
___ some but less than 1 whole one.
___ 0 cigarettes

5b. How much have you chewed tobacco, smoked a pipe or smoked a cigar today? (please circle the appropriate number for each of the three)

Chewing tobacco	0 chews	1 chew	2 chews	3+ chews
Pipe	0 pipes	1 pipe	2 pipes	3+ pipes
Cigar	0 cigars	1 cigar 2 cigars	3+ cigars	

6a. How many hours of sleep did you get **last night?** (please check one)
___ more than 12 hours
___ 11 to 12 hours
___ 9 to 10 hours
___ 7 to 8 hours
___ 5 to 6 hours
___ 4 hours
___ 3 hours
___ 2 hours
___ 1 hour
___ some but less than 1 whole hour.
___ 0 hours

6b. How many hours of sleep do you typically get? (please check one)
___ more than 12 hours
___ 11 to 12 hours

___ 9 to 10 hours
___ 7 to 8 hours
___ 5 to 6 hours
___ 4 hours
___ 3 hours
___ 2 hours
___ 1 hour
___ some but less than 1 whole hour.
___ 0 hours

7a. When was the last time you had something to eat?_____ **AM / PM (please circle)**

7b. What was it?_____

7c. Please rate how typical it is for you eat this amount by this time of day by circling a number on the following 5-point scale.

1	2	3	4	5
I typically have MUCH LESS to eat		**I typically have this much**		**I typically have MUCH MORE to eat**

Appendix C

DASS21

Name: *Date:*

Please read each statement and circle a number 0, 1, 2 or 3 that indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

Appendix D

NIAAA Questions, Three Question Set

Question 1 - (asks about frequency of past 12 month drinking)

During the last 12 months, how often did you usually have any kind of drink containing alcohol? **By a drink we mean half an ounce of absolute alcohol (e.g. a 12 ounce can or glass of beer or cooler, a 5 ounce glass of wine, or a drink containing 1 shot of liquor)**. Choose only one.

Every day
5 to 6 times a week
3 to 4 times a week
twice a week
once a week
2 to 3 times a month
once a month
3 to 11 times in the past year
1 or 2 times in the past year

(IF RESPONDENT GIVES ANY OF THE ABOVE RESPONSES, GO TO QUESTION 2)

I did not drink any alcohol in the past year, but I did drink in the past
(GO TO QUESTION 1A)

I never drank any alcohol in my life
(GO TO QUESTION 1B)

1A - During your lifetime, what is the maximum number of drinks containing alcohol that you drank within a 24-hour period? (asked here only of those who did not drink any alcohol during the past 12 months)

36 drinks or more
24 to 35 drinks
18 to 23 drinks
12 to 17 drinks
8 to 11 drinks
5 to 7 drinks
4 drinks
3 drinks
2 drinks
1 drink

(DONE WITH ALCOHOL QUESTIONS)

1B - So you have never had a drink containing alcohol in your entire life. (asked only of those who say they never drank alcohol in their lives)

Yes, I never drank.
(DONE WITH ALCOHOL QUESTIONS)

No, I did drink
(GO BACK TO QUESTION 1 AND REPEAT)

Question 2 - (asks about number of drinks on typical drinking day in past 12 months)

During the last 12 months, how many alcoholic drinks did you have on a typical day when you drank alcohol?

25 or more drinks
19 to 24 drinks
16 to 18 drinks
12 to 15 drinks
9 to 11 drinks
7 to 8 drinks
5 to 6 drinks
3 to 4 drinks
2 drinks
1 drink

Question 3 - (asks about frequency of binge drinking in past 12 months)

During the last 12 months, how often did you have 5 or more (males) or 4 or more (females) drinks containing any kind of alcohol in within a two-hour period? [That would be the equivalent of at least 5 (4) 12-ounce cans or bottles of beer, 5 (4) five ounce glasses of wine, 5 (4) drinks each containing one shot of liquor or spirits - to be provided by interviewer if asked.] Choose only one:

Every day
5 to 6 days a week
3 to 4 days a week
two days a week
one day a week
2 to 3 days a month
one day a month
3 to 11 days in the past year
1 or 2 days in the past year

Appendix E

SHORT MICHIGAN ALCOHOL SCREENING TEST

(SMAST)

NAME: _____ Date:_____

The following questions concern information about your involvement with alcohol during the past 12 months. Carefully read each countyment and decide if your answer is "YES" or "NO". Then, check the appropriate box beside the question.

Please answer every question. If you have difficulty with a countyment, then choose the response that is mostly right.

These questions refer to the past 12 months only. YES NO

1. Do you feel that you are a normal drinker? (by normal we mean do you drink less than or as much as most other people.)

2. Does your wife, husband, a parent, or other near relative ever worry or complain about your drinking?

3. Do you ever feel guilty about your drinking?

4. Do friends or relatives think you are a normal drinker?

5. Are you able to stop drinking when you want to?

6. Have you ever attended a meeting of Alcoholics Anonymous (AA)?

7. Has your drinking ever created problems between you and your wife, husband, a parent or other near relative?

8. Have you ever gotten into trouble at work because of your drinking?

9. Have you ever neglected your obligations, your family, or your work for two or more days in a row because you were drinking?

10. Have you ever gone to anyone for help about your drinking?

11. Have you ever been in a hospital because of drinking?

12. Have you ever been arrested for drunken driving, driving while intoxicated, or driving under the influence of alcoholic beverages?

13. Have you ever been arrested, even for a few hours, because of other drunken behaviors?

Appendix F

EATING SCREEN

Please carefully complete all questions.

Over the past 3 months… Not at all Slightly Moderately Extremely

1. Have you felt fat?. 0 1 2 3 4 5 6

2. Have you had a definite fear that you

might gain weight or become fat?. 0 1 2 3 4 5 6

3. Has your weight influenced how you think

about (judge) yourself as a person?. 0 1 2 3 4 5 6

4. Has your shape influenced how you think

about (judge) yourself as a person?. 0 1 2 3 4 5 6

5. During the past **6 months** have there been times when you felt you have eaten what other people would regard as an

unusually large amount of food (e.g., a quart of ice cream) given the circumstances? . . . . . YES NO

6. During the times when you ate an unusually large amount of food, did you experience a loss

of control (feel you couldn't stop eating or control what or how much you were eating)? . . . . YES NO

7. How many **DAYS per week** on average over the **past 6 MONTHS** have you eaten an unusually large amount of food

and experienced a loss of control? 0 1 2 3 4 5 6 7

8. How many **TIMES per week** on average over the **past 3 MONTHS** have you eaten an unusually large amount of food

and experienced a loss of control? 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

During these episodes of overeating and loss of control did you…

9. Eat much more rapidly than normal?. . . . . YES NO

10. Eat until you felt uncomfortably full?. . . . . YES NO

11. Eat large amounts of food when you didn't feel physically hungry?. . . . . .
YES NO

12. Eat alone because you were embarrassed by how much you were eating?. . . . . .
YES NO

13. Feel disgusted with yourself, depressed, or very guilty after overeating?. . . . . .
YES NO

14. Feel very upset about your uncontrollable overeating or resulting weight gain?. . .
YES NO

15. How many **times per week** on average over the past **3 months** have you made yourself vomit to prevent weight gain or counteract the effects of eating? 0 1 2 3 4 5 6 7 8 9

10 11 12 13 14

16. How many **times per week** on average over the past **3 months** have you used laxatives or diuretics to prevent weight

gain or counteract the effects of eating? 0 1 2 3 4 5 6 7 8 9

10 11 12 13 14

17. How many **times per week** on average over the past **3 months** have you fasted (skipped at least 2 meals in a row) to

prevent weight gain or counteract the effects of eating? 0 1 2 3 4 5 6 7

8 9 10 11 12 13 14

18. How many **times per week** on average over the past **3 months** have you engaged in excessive exercise specifically to

counteract the effects of overeating episodes? 0 1 2 3 4 5 6 7 8

9 10 11 12 13 14

19. How much do you weigh? If uncertain, please give your best estimate. lbs.

20. How tall are you? _Please specify in inches (5 ft.= 60 in.)___ in.

21. Over the past **3 months**, how many menstrual periods have you missed? 0 1 2 3 n/a

22. Have you been taking birth control pills during the past **3 months**?. . . . . .
YES NO

Appendix G

EATING QUESTIONNAIRE

Instructions: The following questions are concerned with the past four weeks (28 days) only. Please read each question carefully. Please answer all the questions. Thank you.

Questions 1 to 12: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days) only.

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	On how many of the past 28 days …..	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
1	Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
2	Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?	0	1	2	3	4	5	6
3	Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
4	Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
5	Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?	0	1	2	3	4	5	6
6	Have you had a definite desire to have a totally flat stomach?	0	1	2	3	4	5	6
7	Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0	1	2	3	4	5	6
8	Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0	1	2	3	4	5	6
9	Have you had a definite fear of losing control over eating?	0	1	2	3	4	5	6
10	Have you had a definite fear that you might gain weight?	0	1	2	3	4	5	6
11	Have you felt fat?	0	1	2	3	4	5	6
12	Have you had a strong desire to lose weight?	0	1	2	3	4	5	6

Questions 13-18: Please fill in the appropriate number in the boxes on the right. Remember that the questions only refer to the past four weeks (28 days).

Over the past four weeks (28 days) ……

13 Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?	……..
14 ….. On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)?	……..
15 Over the past 28 days, on how many **DAYS** have such episodes of overeating occurred (i.e., you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?	……..
16 Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?	……..
17 Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight?	……..
18 Over the past 28 days, how many times have you exercised in a "driven" or "compulsive" way as a means of controlling your weight, shape or amount of fat, or to burn off calories?	……..

Questions 19 to 21: Please circle the appropriate number. Please note that for these questions the term "binge eating" means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

19 Over the past 28 days, on how many days have you eaten in secret (ie, furtively)? ….. Do not count episodes of binge eating	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
	0	1	2	3	4	5	6
20 On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight? ….. Do not count episodes of binge eating	None of the times	A few of the times	Less than half	Half of the times	More than half	Most of the time	Every time
	0	1	2	3	4	5	6
21 Over the past 28 days, how concerned have you been about other people seeing you eat? ….. Do not count episodes of binge eating	Not at all		Slightly		Moderately		Markedly
	0	1	2	3	4	5	6

Questions 22 to 28: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days).

	Over the past 28 days …..	**Not at all**		**Slightly**		**Moderate -ly**		**Markedly**
22	Has your weight influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
23	Has your shape influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
24	How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	0	1	2	3	4	5	6
25	How dissatisfied have you been with your weight?	0	1	2	3	4	5	6
26	How dissatisfied have you been with your shape?	0	1	2	3	4	5	6
27	How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	0	1	2	3	4	5	6
28	How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	0	1	2	3	4	5	6

What is your weight at present? (Please give your best estimate.) ……

What is your height? (Please give your best estimate.) ……

If female: Over the past three-to-four months have you missed any menstrual periods? ……

If so, how many? ……

Have you been taking the "pill"? ……

THANK YOU

Appendix H

UPPS-P

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you **Agree Strongly** circle **1**, if you **Agree Somewhat** circle **2**, if you **Disagree somewhat** circle **3**, and if you **Disagree Strongly** circle **4**. Be sure to indicate your agreement or disagreement for every statement below. Also, there are questions on the following pages.

	Agree Strongly	Agree Some	Disagree Some	Disagree Strongly
1. I have a reserved and cautious attitude toward life.	1	2	3	4
2. I have trouble controlling my impulses.	1	2	3	4
3. I generally seek new and exciting experiences and sensations.	1	2	3	4
4. I generally like to see things through to the end.	1	2	3	4
5. When I am very happy, I can't seem to stop myself from doing things that can have bad consequences.	1	2	3	4
6. My thinking is usually careful and purposeful.	1	2	3	4
7. I have trouble resisting my cravings (for food, cigarettes, etc.).	1	2	3	4
8. I'll try anything once.	1	2	3	4
9. I tend to give up easily.	1	2	3	4
10. When I am in great mood, I tend to get into situations that could cause me problems.	1	2	3	4
11. I am not one of those people who blurt out things without thinking.	1	2	3	4
12. I often get involved in things I later wish I could get out of.	1	2	3	4
13. I like sports and games in which you have to choose your next move very quickly.	1	2	3	4
14. Unfinished tasks really bother me.	1	2	3	4
15. When I am very happy, I tend to do things that may cause problems in my life.	1	2	3	4
16. I like to stop and think things over before I do them.	1	2	3	4
17. When I feel bad, I will often do things I later regret in order to make myself feel better now.	1	2	3	4
18. I would enjoy water skiing.	1	2	3	4
19. Once I get going on something I hate to stop.	1	2	3	4
20. I tend to lose control when I am in a great mood.	1	2	3	4
21. I don't like to start a project until I know exactly how to proceed.	1	2	3	4

	Agree Strongly	Agree Some	Disagree Some	Disagree Strongly
22. Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	1	2	3	4
23. I quite enjoy taking risks.	1	2	3	4
24. I concentrate easily.	1	2	3	4
25. When I am really ecstatic, I tend to get out of control.	1	2	3	4
26. I would enjoy parachute jumping.	1	2	3	4
27. I finish what I start.	1	2	3	4
28. I tend to value and follow a rational, "sensible" approach to things.	1	2	3	4
29. When I am upset I often act without thinking.	1	2	3	4
30. Others would say I make bad choices when I am extremely happy about something.	1	2	3	4
31. I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.	1	2	3	4
32. I am able to pace myself so as to get things done on time.	1	2	3	4
33. I usually make up my mind through careful reasoning.	1	2	3	4
34. When I feel rejected, I will often say things that I later regret.	1	2	3	4
35. Others are shocked or worried about the things I do when I am feeling very excited.	1	2	3	4
36. I would like to learn to fly an airplane.	1	2	3	4
37. I am a person who always gets the job done.	1	2	3	4
38. I am a cautious person.	1	2	3	4
39. It is hard for me to resist acting on my feelings.	1	2	3	4
40. When I get really happy about something, I tend to do things that can have bad consequences.	1	2	3	4
41. I sometimes like doing things that are a bit frightening.	1	2	3	4
42. I almost always finish projects that I start.	1	2	3	4
43. Before I get into a new situation I like to find out what to expect from it.	1	2	3	4
44. I often make matters worse because I act without thinking when I am upset.	1	2	3	4
45. When overjoyed, I feel like I can't stop myself from going overboard.	1	2	3	4

	Agree Strongly	Agree Some	Disagree Some	Disagree Strongly
46. I would enjoy the sensation of skiing very fast down a high mountain slope.	1	2	3	4
47. Sometimes there are so many little things to be done that I just ignore them all.	1	2	3	4
48. I usually think carefully before doing anything.	1	2	3	4
49. When I am really excited, I tend not to think of the consequences of my actions.	1	2	3	4
50. In the heat of an argument, I will often say things that I later regret.	1	2	3	4
51. I would like to go scuba diving.	1	2	3	4
52. I tend to act without thinking when I am really excited.	1	2	3	4
53. I always keep my feelings under control.	1	2	3	4
54. When I am really happy, I often find myself in situations that I normally wouldn't be comfortable with.	1	2	3	4
55. Before making up my mind, I consider all the advantages and disadvantages.	1	2	3	4
56. I would enjoy fast driving.	1	2	3	4
57. When I am very happy, I feel like it is ok to give in to cravings or overindulge.	1	2	3	4
58. Sometimes I do impulsive things that I later regret.	1	2	3	4
59. I am surprised at the things I do while in a great mood.	1	2	3	4

Appendix I

SPSRQ

1.	Do you often refrain from doing something because you are afraid of it being illegal?	No	Yes
2.	Does the good prospect of obtaining money motivate you strongly to do some things?	No	Yes
3.	Do you prefer not to ask for something you are not sure you will obtain it?	No	Yes
4.	Are you frequently encouraged to act by the possibility of being valued in your work, in your studies, with your friends or with your family?	No	Yes
5.	Are you often afraid of new or unexpected situations?	No	Yes
6.	Do you often meet people that you find physically attractive?	No	Yes
7.	Is it difficult for you to telephone someone you do not know?	No	Yes
8.	Do you like taking some drugs because of the pleasure you get from them?	No	Yes
9.	Do you often renounce your rights when you know you can avoid a quarrel with a person or an organization?	No	Yes
10.	Do you often do things to be praised?	No	Yes
11.	As a child, were you troubled by punishments at home or in school?	No	Yes
12.	Do you like being the center of attention at a party or a social meeting?	No	Yes
13.	In tasks that you are not prepared for, do you attach great importance to the possibility of failure?	No	Yes
14.	Do you spend a lot of your time on obtaining a good image?	No	Yes
15.	Are you easily discouraged in difficult situations?	No	Yes
16.	Do you need people to show their affection for you all the time?	No	Yes
17.	Are you a shy person?	No	Yes
18.	When you are with a group, do you try to make your opinions the most intelligent or the funniest?	No	Yes

19. Whenever possible, do you avoid demonstrating your skills for fear of being embarrassed?	No	Yes
20. Do you often take the opportunity to pick up people you find attractive?	No	Yes
21. When you are with a group, do you have difficulties selecting a good topic to talk about?	No	Yes
22. As a child, did you do a lot of things to get people's approval?	No	Yes
23. Is it often difficult for you to fall asleep when you think about things you have done or must do?	No	Yes
24. Does the possibility of social advancement, move you to action, even if this involves not playing fair?	No	Yes
25. Do you think a lot before complaining in a restaurant if your meal is not well prepared?	No	Yes
26. Do you generally give preference to those activities that imply an immediate gain?	No	Yes
27. Would you be bothered if you had to return to a store when you noticed you were given the wrong change?	No	Yes
28. Do you often have trouble resisting the temptation of doing forbidden things?	No	Yes
29. Whenever you can, do you avoid going to unknown places?	No	Yes
30. Do you like to compete and do everything you can do to win?	No	Yes
31. Are you often worried by things you said or did?	No	Yes
32. Is it easy for you to associate tastes and smells to very pleasant events?	No	Yes
33. Would it be difficult for you to ask your boss for a raise (salary increase)?	No	Yes
34. Are there a large number of objects or sensations that remind you of pleasant events?	No	Yes
35. Do you generally avoid speaking in public?	No	Yes
36. When you start to play with a slot machine, is it often difficult for you to stop?	No	Yes
37. Do you, on a regular basis, think that you could do more things if it was not for your insecurity or fear?	No	Yes

38. Do you sometimes do things for quick gains?	No	Yes
39. Comparing yourself to people you know, are you afraid of many things?	No	Yes
40. Does your attention easily stray from your work in the presence of an attractive stranger?	No	Yes
41. Do you often find yourself worrying about things to the extent that performance in intellectual abilities is impaired?	No	Yes
42. Are you interested in money to the point of being able to do risky jobs?	No	Yes
43. Do you often refrain from doing something you like in order not to be rejected or disapproved by others?	No	Yes
44. Do you like to put competitive ingredients in all of your activities?	No	Yes
45. Generally, do you pay more attention to threats than to pleasant events?	No	Yes
46. Would you like to be a socially powerful person?	No	Yes
47. Do you often refrain from doing something because of your fear of being embarrassed?	No	Yes
48. Do you like displaying your physical abilities even though this may involve danger?	No	Yes

Appendix J

Table 13. Bivariate Correlations for Dependent Variables, Stroop Mean Reaction Times and Average Errors

Variable	Neutral MRT	Negative MRT	Positive MRT	Food MRT	Alcohol MRT	Neutral Err	Negative Err	Positive Err	Food Err	Alcohol Err
1. GLS EDE-Q	.126	.134	.114	.161	.177	-.153	**-.255***	**-.273***	.003	-.187
2. EDDS Binge 6 Months	-.166	-.167	-.102	-.149	-.117	.190	.181	-.037	.170	**.246***
3. SMAST Scores	.149	.133	.100	.102	.138	-.068	-.043	**-.292***	.024	.002
4. Binge Drinking	-.068	-.059	-.033	-.077	-.159	.127	-.020	-.110	.126	.084

Note. GLS = Global Score. EDE-Q = Eating Disorder Examination Questionnaire. EDDS = Eating Disorder Diagnostic Scale. SMAST=Short Michigan Alcoholism Screening Test. MRT=Mean Reaction Time, Err=Error. N=75 for SMAST scores and EDDS Binge 6 Months, N = 73 for Stroop scores; and N = 63 for GLS-EDE-Q. Correlations statistically significantly greater than 0 are in bold text.

* $.01 < p \leq .05$; ** $.001 < p \leq .01$; *** $p \leq .001$

Table 15. Bivariate Correlations for the Outcome Variables and Impulsivity Traits for Each Sex Independently.

Table 14. Bivariate Correlations for Impulsivity Traits, Stroop Mean Reaction Times and Average Errors

Variable	Neutral MRT	Negative MRT	Positive MRT	Food MRT	Alcohol MRT	Neutral Err	Negative Err	Positive Err	Food Err	Alcohol Err
1. SS	.025	.084	.128	.065	.033	.027	-.144	-.111	.183	.073
2. NU	.035	.017	.036	.002	.084	.177	.226	-.131	.056	.057
3. Per	.019	.026	.014	.038	.038	.148	.140	**-.240***	-.060	.031
4. PU	.037	.065	.050	.051	.048	.025	.001	-.143	.075	.062
5. Pre	-.179	-.115	-.128	-.160	-.095	.037	.155	.023	.164	**.231***
6. PunSen	.124	.158	.080	.128	.108	-.145	-.097	-.095	-.161	-.138
7. RewSen	.045	.032	.008	.007	.042	.120	-.005	-.161	-.055	-.040

Note. SS=Sensation Seeking, NU=Negative Urgency, Per=Lack of Perseverance, Pu=Positive Urgency, Pre=Lack of Premeditation, PunSen=Punishment Sensitivity, RewSen=Reward Sensitivity, MRT=Mean Reaction Time, Err=Error. N=74 for UPPS-P scales and N = 73 for Reward Sensitivity, Punishment Sensitivity, and Stroop scores. Correlations statistically significantly greater than 0 are in bold text.

* $.01 < p \leq .05$; ** $.001 < p \leq .01$; *** $p \leq .001$

	1	2	3	4	5	6	7	8	9	10	11
1. GLS EDE-Q		**.349***	.222	-.238	.245	.285	.107	**.511*****	.073	.269	-.073
2. EDDS Binge 6 Months	.381		.220	.069	.149	.007	-.074	.153	.269	.009	.114
3. SMAST Scores	.205	.061		.200	-.184	.020	-.015	.131	**.407****	.195	**.415****
4. Binge Drinking	-.131	-.306	.117		.118	-.257	**.417****	.071	.140	.262	**.353***
5. Reward Sensitivity	-.004	.035	.384	.355		-.024	**.490****	**.516*****	.131	**.520*****	.166
6. Punishment Sensitivity	.361	-.025	.331	-.344	.161		-.128	.258	-.017	.113	-.276
7. Sensation Seeking	-.211	-.036	-.241	**.521****	.279	**-.554****		.125	-.201	**.369***	.040
8. Negative Urgency	.288	.332	.354	.032	**.533****	.217	.034		**.327***	**.748*****	.271
9. Perseverance	.362	.233	.128	-.187	-.161	**.541****	**-.524****	.342		.170	**.507*****

(Lack of)											
10. Positive Urgency	.171	.190	.159	.266	**.476***	.106	.333	**.593****	.169		**.354***
11. Premeditation (Lack of)	-.005	.150	.144	.277	.226	-.281	.283	.342	.061	.343	

Note: GLS = Global Score. EDE-Q = Eating Disorder Examination Questionnaire. EDDS = Eating Disorder Diagnostic Scale. SMAST=Short Michigan Alcohol Screening Test. N = 63 for GLS-EDE-Q; N = 73 for EDDS Binge 6 months, Reward Sensitivity, Punishment Sensitivity; N = 74 for UPPS-P scales; and N=75 for SMAST scores and Binge Drinking. Descriptive statistics are for log transformed scores of all measures except UPPS-P and SPSRQ scales. Coefficients in the bottom diagonal are for males and above the diagonal are for females, and both were conducted on log transformed data. Correlations were also calculated for binge eating frequency in the past 28 days and past three months. All binge eating frequencies had the same correlations for males, but for females binge eating frequency for the past 3 months was significantly correlated with Lack of Perseverance, and binge eating frequency in the past 28 days was significantly correlated with Negative Urgency and Lack of Perseverance. Correlations statistically significantly greater than 0 are in bold text.

* $.01 < p \leq .05$; **$.001 < p \leq .01$; *** $p \leq .001$